A POSTCOLONIAL RENDITION OF MATHEMATICS EDUCATION OF NEPAL: AN AUTO/ETHNOGRAPHIC INQUIRY

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A Thesis

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AN ABSTRACT

of the thesis of *Basanta Raj Lamichhane* for the degree of *Doctor of Philosophy in Education (STEAM Education)* presented on *30 July 2026*, entitled *A Postcolonial Rendition of Mathematics Education of Nepal: An Auto/ethnography Inquiry*

APPROVED BY

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Prof. Bal Chandra Luitel, PhD

Thesis Supervisor

The research issue emerged through my lived experiences. I have experienced that modern education had started by blaming the Nepali people as illiterate and uncivilized by creating a meta-narrative that they need to be educated and civilized. Likewise, it instigated the misconception that we have no onto-epistemic practices and no history of mathematics education (ME) worth including in the curriculum. In this context, three experiential metaphors, a winner-takes-all approach of curriculum, pedagogy as/for developing false consciousness, and assignment as/for instigating marginalization have guided me to formulate an overarching research question: How has the colonial legacy embedded in ME and how do my research participants and I construct visions for inclusive ME in Nepal?

I have used postcolonial perspectives (Gandhi, 2019; Said, 1978; Young, 2016), knowledge constitutive interest (Habermas, 1972), and critical pedagogy (Freire, 1993, 2005) as theoretical referents. I have employed postcolonialism as a broadly connected and complex theoretical perspective that enables me to zoom out to the larger scenario of ME, not limited to the human kingdom, and explore the interdependence and coexistence of human beings and the rest of nature by incorporating strategic essentialism. The knowledge-constitutive interest (Habermas, 1972) and critical pedagogy (Freire, 2005) helped develop a vision of an inclusive curriculum, futuristic pedagogy, and transformative assessment by fostering the notion of collective well-being and autonomous responsible scholarship.

The nature of my research issues demands a multi-paradigmatic research design. I have incorporated critical paradigm—taking a stand, interpretive paradigm—grounding in a context, postmodern paradigm—multiple representations, and integral paradigm—making holistic meaning. I have used a postcolonial auto/ethnography (Lamichhane & Luitel, 2023b; Toyosaki, 2017) to explore the colonial remnants in ME. Its dialectical and praxis-oriented approach allowed me to embrace writing as a process of inquiry, leading me to create layered writing. In so doing, narrative, poetic, metaphorical, and non-textual genres, as well as formal and informal conversations (dialogues) have been used to generate field texts. Likewise, the postcolonial auto/ethnography enabled me to adopt empathetic, inclusive and healing perspectives as an ethical responsibility of the researcher.

In this inquiry, I have explored how the existing mathematics curriculum seemed irrelevant. It did not recognize learners' lifeworlds by endorsing an exclusive view of reality, promoting colonial ideology—consumerism, linguistic erasures, and the devaluation of onto-epistemic practices and scholarship. I have also revealed that pedagogy focused on developing magic/naïve consciousness, magnifying social/epistemic injustices, and concealing the glocal crises. In a similar vein, the existing assessment system used to validate epistemic injustices through the colonial numerological approach further promotes disciplinary egocentrism in ME and blames learners for their underachievement.

In this context, I have offered an inclusive vision of ME. The mathematics curriculum incorporates the zoe, eco, and techno visions to raise awareness of the world's present crises and to realize a coexistence of human culture and the natural world for healing wounded humanity and the planetary earth. Likewise, it underscored the urgent need to teach children, not just mathematics, to cultivate spiritual consciousness and foster transformative praxis to create a peaceful, socially just, and sustainable future. To achieve these traits, my inquiry has suggested adopting an engaged pedagogy to enhance critical consciousness, encouraging learners to pay attention and make a possible contribution to planetary well-being and social and epistemic justice. Moreover, this study revealed that assessment in mathematics must be embedded in the learning process to enhance epistemic justice, enrich holistic learning, and cultivate healing praxis. It illuminates that education should not turn into a weapon for destruction but become a place in which righteous work, responsibility, forgiveness, benevolence, and spirituality are cultivated.

Finally, this research contributes to the fields of postcolonial renditions of ME and postcolonial auto/ethnography, encouraging my readers to critically reflect on curriculum, pedagogy, and assessment practices to bring about transformation by opening new discourse in ME in the context of Nepal.

…… 30 July 2026

Basanta Raj Lamichhane

Degree Candidate

शोधसार

STEAM शिक्षाको विद्यावारिधिको लागि बसन्तराज लामिछानेको शोध प्रबन्धको शीर्षक "नेपालमा गणित शिक्षाको उत्तरऔपनिवेशिक व्याख्याः एक स्व/साँस्कृतिक खोज" १४ श्रावण २०८३ मा प्रस्तुत गरिएको थियो।

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प्रा. बालचन्द्र लुइटेल, पिएचडी

शोध निर्देशक

नेपालमा आधुनिक शिक्षाको सुरूवात नै नेपालीहरू अशिक्षित र असभ्य छन र उनिहरूलाई आधुनिक शिक्षाको माध्यमबाट शिक्षित र सभ्य बनाउन आवश्यक रहेको भाश्य निर्माणपश्चात् गरिएको मेरो अनुभव रहेको छ। यसरी सुरूवात गरिएको शिक्षाले नेपाल र नेपालीहरूको आफ्नो तत्त्व-ज्ञानात्मक अभ्यास नरहेको र भएपनि विद्यालय तथा विश्वविद्यालयका पाठ्यक्रममा समावेश गर्न मिल्ने, विशेषगरी गणित शिक्षाको इतिहास नभएको, भ्रमपूर्ण गलत धारणालाइ प्रोत्साहन गरेको पाइन्छ। यसै सन्दर्भमा यस अध्ययनलाई अगाडि बढाउन आवश्यक अनुसन्धानप्रश्न निर्माणका लागि मुख्यतः तीनवटा रूपकको प्रयोग गरिएको छ। त्यसमा विजेताले सबै चिज नियन्त्रण गर्न पाउछ भन्ने चेतना विकासको सहयोगिका रूपमा पाठ्यक्रम, भ्रामक चेतनाको विकासका रूपमा शिक्षण पद्धति र शिक्षार्थीलाई सीमान्तकृत गर्ने कार्यको सुरुवातका रूपमा मूल्याङ्कन प्रकृया रहेका छन्। नेपालको गणित शिक्षामा कसरी औपनिवेशिक प्रभुत्व कायम रहेको छ र नेपालको सन्दर्भमा कसरी समावेशी गणित शिक्षाको दृष्टिकोण निर्माण गर्न सकिन्छ भन्ने मुख्य प्रश्नमा आधारित रहेर यस अध्ययनलाई अगाडि बढाइएको छ।

यस अध्ययनका सिलसिलामा प्राप्त स्थलगत रिपोर्ट, सूचना तथा जानकारीहरूको व्याख्या, विश्लेषण र अर्थनिर्माणका लागी उत्तरऔपनिवेशिक दृष्टिकोण (Said, 1978; Young, 2016; Gandhi, 2019), ज्ञान-संरचनात्मक रूचिहरू (Habermas, 1972) र समालोचनात्मक शिक्षण पद्धतिलाई (Freire, 1993, 2005) सैद्धान्तिक अवधारणाका रूपमा उपयोग गरिएको छ। उत्तरऔपनिवेशिक दृष्टिकोणलाई नेपालमा गणित शिक्षामा रहेको औपनिवेशिक प्रभुत्व उजागर गर्नुका साथै गणित शिक्षालाई विहङ्गम दृष्टिले उजागर गर्न एक संयोजनात्मक र जटिल सैद्धान्तिक अवधारणाका रूपमा प्रयोग गरिएको छ, जसले समावेशी गणित शिक्षाको दृष्टिकोण निर्माणका लागि मानव जगतमा मात्र सीमित नरही मानवलगायत सम्पूर्ण चराचर जगत् तथा प्रकृति बिचको अन्तरनिर्भरता र सहअस्तित्वलाई रणनीतिक आवश्यकतका आधारमा व्याख्या र विश्लेषण गर्न सहयोग पुऱ्याउँदछ। त्यसैगरि Habermas (1972) को ज्ञान-संरचनात्मक रूचिहरू र Freire (1993, 2005) को समालोचनात्मक शिक्षण पद्धतिले समावेशी पाठ्यक्रम, भविष्यमुखी शिक्षण पद्धति र रूपान्तरणकारी मूल्याङ्कन विधिको सैद्धान्तिक तथा दार्शनिक दृष्टिकोण निर्माणमा

सहयोग गरेका छन् । उल्लिखित पाठ्यक्रम, शिक्षण विधि र मूल्याङ्कन पद्धतिको मुख्य उद्देश्य सिकारुलाई आ-आफ्नो विद्वत्वको स्वायत्त, उत्तरदायी र जिम्मेवारीपूर्वक प्रयोग गरी सामूहिक कल्याणको प्रर्वद्धन गर्ने रहेको छ ।

उल्लिखित विशेषताका आधारमा मेरो अध्ययनले कुनै एउटा वस्तुगत, सामान्यकृत तथा एकै प्रकारको विशिष्टीकृत गणित शिक्षाभन्दा विषयगत, समसामयिक, स्थानीय मूल्यमान्यता र ज्ञानपद्धतिलाई समेत न्याय गर्न सक्ने गणित शिक्षाको खोजी गर्न उद्धत रहेकाले बहुआयामिक दार्शनिक दृष्टिकोणात्मक ढाँचाको आवश्यकतालाई इङ्गित गरेकाले सोही अनुसारको बहुआयामिक ढाँचाभित्र रहेर अध्ययन गरिएको छ । यस सन्दर्भमा मैले समालोचनात्मक, व्याख्यात्मक, उत्तरआधुनिक र समष्टिगत दार्शनिक आयामहरूको प्रयोग गरी अध्ययनलाई अगाडि बढाएको छु । मैले गणित शिक्षामा औपनिवेशिक प्रभुत्वको उत्खनन् तथा समावेशी र सशक्त गणित शिक्षाको दृष्टिकोण निर्माणका लागि उत्तरऔपनिवेशिक स्व/सांस्कृतिक खोज विधिको प्रयोग गरी अध्ययन गरेको छु । यसका सशक्तीकरण, न्यायिक, समावेशिक, द्वन्द्वात्मक र अभ्यासात्मक जस्ता मुख्य विशेषताहरूलाई अनुसन्धानात्मक प्रकृयामा समावेश गर्नुका साथै लेखनलाई नै खोजीको मुख्य साधनका रूपमा अँगाली तहगत लेखनका माध्यमबाट यस अध्ययनलाई अगाडि बढाइएको छ । यस क्रममा आवश्यक स्थलगत वर्णनात्मक तथाङ्क सिर्जना गर्न सङ्कथानात्मक, काव्यिक, रूपकात्मक र गैह्रपाठात्मक विधाहरूका साथै औपचारिक र अनौपचारिक छलफल, व्यक्तिगत डायरीलाई प्रयोगमा ल्याइएको छ । यसैगरी बहुआयामिक दार्शनिक आयाम, विविध विधाको प्रयोग र उत्तरऔपनिवेशिक स्व/सांस्कृतिक खोज विधिले मलाई समानुभूतिमा आधारित समावेशिता र कल्याणात्मक तथा उपचारात्मक जस्ता मूल्यमान्यतामा रहेर एक जिम्मेवार अनुसन्धानकर्ताका रूपमा अनुसन्धानलाई अगाडि बढाउन प्रेरित गरेको छ ।

उल्लिखित विधा, विधि, दार्शनिक दृष्टिकोण र सैद्धान्तिक परिदृश्यका सहायताले मैले समावेशी गणित शिक्षाको दृष्टिकोण प्रस्तुत गरेको छु । गणित शिक्षा छुट्टै एकाङ्की विधाका रूपमा नभई, मानिस, संस्कृति र सम्पूर्ण चराचर जगत् तथा प्रकृति बिचको सहअस्तित्वका लागि हुनुपर्दछ, जसले विचलित र घायल अवस्थामा रहेको मानवता र प्राकृतिक विनाशलाई मलम लगाई पुनर्जीवन दिनका लागि जैविक, पारिस्थितिक र प्राविधिक आयामलाई सन्तुलित ढङ्गले समावेश गरी वर्तमान विश्व सङ्कटप्रति सचेत रहन र सजग गराउन सकोस् । उक्त दृष्टिकोणअनुसार बालबालिकाहरूलाई कोरा गणितीय विषयवस्तु मात्र पढाउने होइन, बरु उनीहरूमा आध्यात्मिक सचेतना जगाई रूपान्तरणकारी अभ्यासहरूमा संलग्न गराउन अभिप्रेरित गर्ने विषयवस्तुहरू समावेश गरी उनीहरूलाई न्यायिक, शान्त र दिगोभविष्य निर्माणका लागि अग्रसर रहन उद्धेलित गरोस् । यी विशेषताहरू प्राप्तिका लागि मेरो अध्ययनले गहन सहभागितामूलक शिक्षण पद्धतिको प्रस्ताव गरेको छ, जसले समालोचनात्मक चेतना अभिवृद्धि गर्न, सम्पूर्ण जैविक तथा प्राकृतिक जगतको कल्याण तथा समाजिक र तत्त्व-ज्ञानात्मक न्याय स्थापनाका लागि विद्यार्थीहरूलाई प्रेरित गर्न सकियोस् । समाजिक तथा तत्त्व-ज्ञानात्मक न्याय प्रर्वद्धनका लागि सर्वाङ्गीण सिकाइ र कल्याणकारी अभ्यासमा केन्द्रित शिक्षण पद्धति अँगाल्नुपर्दछ । यसका अतिरिक्त यस अध्ययनले गणित विषयको मूल्याङ्कन प्रकृया उल्लिखित पाठ्यक्रम र शिक्षण विधिसँग अन्तरघुलित हुनुपर्ने कुरालाई जोड दिएको छ । यसका साथै यस अध्ययनले के इङ्गित

गरेको छ भने शिक्षालाई विनाशकारी हतियारका रूपमा प्रयोग गरी सम्पूर्ण पृथ्वीलाई नै अस्तित्वको सङ्कटमा धकेल्ने काम आधुनिक शिक्षा तथा वर्तमानमा कायम रहेको नवउदारवादी बजारनीति, जुन उपनिवेशको नयाँ स्वरूपका रूपमा देखापरेको छ, जसले शिक्षाको मुख्य दार्शनिक दृष्टिकोणमा आधारभूत परिवर्तन गरी शिक्षालाई निजी स्वार्थ र साँघुरो राष्ट्रियता, धार्मिक तथा जातीय परिधिमा सिमित गरेको छ। यसबाटब बाहिर निकालेर, आध्यात्मिकता, जिम्मेवारिता, क्षमाशीलता, परोपकारिता र वसुदैव कुटुम्बकम् जस्ता गुणहरूलाई अनुसरण गरी व्यवहारमा उतार्न सम्पूर्ण मानव समाजलाई अभिप्रेरित गर्ने गणित शिक्षा हुनुपर्दछ भन्ने निष्कर्ष रहेको छ।

अन्त्यमा, यस अध्ययनले नेपालमा गणित शिक्षाको उत्तरऔपनिवेशिक अनुसन्धानको ढोका खोल्नुका साथै यसको अध्ययनको लागि नेपाली विशेषता सहितको उत्तरऔपनिवेशिक स्व/सांस्कृतिक अध्ययन विधिको सुरूवात गरेकाले शिक्षक, विद्यार्थी, अनुसन्धानकर्ता तथा पाठकहरूलाई समावेशी र रूपान्तरणकारी नयाँ बहसमा सहभागिताका लागि प्रोत्साहन गर्दै नेपालमा गणित शिक्षाको पाठ्यक्रम, शिक्षण पद्धति र मूल्याङ्कन प्रकृयामा सधैँ समालोचनात्मक दृष्टिगोचर गरी सजग तथा सचेत रहन प्रेरित गरेको छ।

..... १४ श्रावण २०८३

बसन्तराज लामिछाने

शोधकर्ता

This thesis entitled *A Postcolonial Rendition of Mathematics Education of Nepal: An Auto/Ethnographic Inquiry* presented by of *Basanta Raj Lamichhane* on *30 July 2026.*

APPROVED BY

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I understand and agree that my thesis will become a part of the permanent collection of the Kathmandu University Library. My signature below authorizes the release of my thesis to any reader upon request for scholarly purposes.

……. 30 July 2026
Basanta Raj Lamichhane
Degree Candidate

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DECLARATION

I hereby declare that this dissertation is my original work, and it has not been submitted for candidature for any other degree at any other university.

…… 30 July 2026

Basanta Raj Lamichhane

Degree Candidate

DEDICATION

I dedicate this thesis to those scholars worldwide who are actively engaging in enhancing humanitarian and ecological perspectives through research and ME for the revitalization of the scholarship of historically disenfranchised nations and majority-minoritized groups. In dedicating this work, I realize that my research will help conceptualize postcolonial rendition for transformative trans/inter/multidisciplinary ME, guiding us toward collective well-being and sustainability of planetary Earth

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Basanta Raj Lamichhane
Degree Candidate

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ABBREVIATIONS

ADB	Asian Development Bank
Aaf	Assessment as Learning
AfL	Assessment of Learning
B.Ed.	Bachelor of Education
BS	Bikram Samvat
CBS	Central Bureau of Statistics
CDC	Curriculum Development Center
ERO	Education Review Office
FWU	Far Western University
GDP	Gross Domestic Product
GNDC	Global North and Developed Country
GoN	Government of Nepal
GSTR	Global South and Tricontinental Region
IMF	International Monetary Fund
ICT	Information and Communication Technology
KU	Kathmandu University
KUSOED	Kathmandu University School of Education
M.Ed.	Master of Education
ME	Mathematics Education
MoF	Ministry of Finance
MU	Mid-West University
NASA	National Assessment of Students Achievement
NAST	Nepal Academy of Science and Technology
NESP	New Education System Plan
NNEPC	Nepal National Educational Planning Commission
NRB	Nepal Rasta Bank
NSO	National Statistical Office
NSU	Nepal Sanskrit University
OECD	Organizations for Economic Co-operation and Development
PCL	Proficiency Certificate Level
PISA	Program for International Students Assessment

PoKU	Pokhara University
PU	Purbanchal University
SEE	Secondary Education Examination
SLC	School Living Certificate
TIMSS	Trends in International Mathematics and Science Study.
TU	Tribhuvan University
UGC	University Grants Commission
UNEP	United Nations Environment Program
UNESCO	United Nations Educational Scientific and Cultural Organization
UNPFII	United Nations Permanent Forum on Indigenous Issues
USAID	United States Agency for International Development
WB	World Bank
WMW	Western Modern Worldview

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CHAPTER I
GENESIS OF MY RESEARCH ISSUE

In this chapter, I have briefly set the scene by outlining how my research issue has emerged and establishing the crux of the problem. I have also set out the purpose and research questions to navigate my research journey. Similarly, I have presented the significance and delimitations of my research, as well as the structure of my thesis's chapters.

Setting the Scene

I have spent approximately 4.5 decades in ME as a student, teacher educator, and practitioner-researcher. During this journey, I faced a series of ups and downs, which are very difficult to recount entirely at a moment. Some of these events are crucial, encouraging me to do this research. I have briefly portrayed how these events decisively led me to frame my research issue.

Be a Gentleman!

Back in the 1980s, I was a primary-level student. As a Nepali student, I learnt the English alphabet in grade four. I struggled to find the meaning of the English word in Nepali. Our English teacher recited the words and sentences from the textbook and encouraged us to repeat the sounds. There were figures and symbols of objects, fruits, animals, etc., that helped me understand the meaning of the English words. Two pictures in the English textbook caught my attention. The first was a picture of a man in an attire of ragged *Kachhad* (a traditional cloth or fabric tied around the waist to cover the lower part of the body), *Bhoto* (a conventional cloth that serves to cover the upper part of the body), a worn coat, and a torn cap, gripping a hoe in one hand. He was looking so tired. There was a small box with the text 'he is a farmer' pointing to the man's head. Likewise, there was another picture of a man, wearing a white shirt, a black coat, pants, a tie, and shoes. He was neat and clean. There was a sentence in a small box, 'he is a gentleman', pointing to the picture.

Apple माने, (अर्थ) स्याउ	Ball माने, भकुण्डो
Cat माने, विरालौ	Dog माने, कुकुर
Elephant माने, हात्ती	Flag माने, झण्डा
Mother माने, आमा	Father माने, बा
Teacher माने, शिक्षक	Framer माने, किसान

Box 1 *My Way of English Learning in Grade Four*

My English teacher used the second picture as a motivational tool. He told us to be gentlemen. A gentleman was an intellectual and civilized person. His life was more advanced than that of the farmer. The gentleman had various opportunities for advancing his livelihood. Unlike gentlemen, the framers always engaged with soil, dust, and water, mud, and smoke. Their lives often resembled the symbols of misery, marked by struggle and deprivation. They did not have a chance to secure a prestigious position in society and the nation due to a lack of intellect, civility, and skills. Likewise, farmers often lacked the time and resources to engage with the outside world beyond their immediate environment. They confined themselves to their agricultural fields and farms, as well as terraced slopes and rugged hillsides. The farmers' lives were and still are under the shadow of the union of sorrow, pain, unrest, deprivation, and misery. You must have left the agrarian occupations and select prestigious jobs that bring you a new sense of dignity. In giving this explanation, my English teacher told us to pursue higher education for personal prosperity and advancement.

I am from a rural part of Nepal. My family belongs to the agricultural profession. Most people in my village also practice agriculture as their primary occupation. The agrarian occupation is indeed traditional and based on the principle of subsistence. I am annoyed and feel highly uncomfortable by the farmers' impertinence, who are the primary producers of the foods that contribute the highest proportion of national income. I do not dare to question it because the disciplinarity system has already trained me to be an uncritical consumer of knowledge.

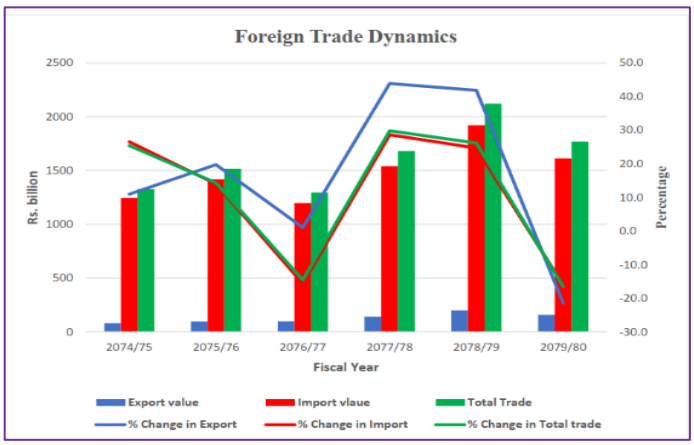
Upon examining the country's statistical data, I have found that it is necessary to equip the younger generation with advanced agricultural knowledge, skills, and technology to contribute to the nation's sustainable development. I find that more than 80% of the active population aged 10 years and above depend on agriculture and contribute to more than two-thirds of Gross Domestic Product (GDP) at that period (Central Bureau of Statistics [CBS], 1984). Moreover, I was taught that Nepal had already been declared an agricultural country, and that the agrarian sector has been given priority in policy documents since the inception of periodic development planning in Nepal in 1952. To date, approximately 50% of the economically active population is involved in the agricultural sector (National Statistical Office [NSO], 2023), and its contribution to the GDP is approximately 24% (Nepal Rastra Bank [NRB], 2024). Why have the younger generations been discouraged from being

involved in agricultural sectors? What effect does it have on the social, economic, and political sectors of the nation?

The annual foreign trade statistics published by the Ministry of Finance, Department of Customs, in July 2025, revealed that agricultural goods worth approximately Rs. 395 billion were imported in the last fiscal year 2024/025. It is nearly 54% higher than the last fiscal year 2023/024. The rapid increase in imports of agricultural goods reveals a significant gap between national agricultural production and demand. It further shows that the country's total imports of agricultural products exceed its total exports (MoF, 2025). Among the agricultural products, paddy, rice, maize, lentils, vegetables, fruits, cooking oil, and livestock feed account for a significant share of the import basket. These items could have been produced sufficiently in the country if the government of Nepal had managed sufficient irrigation facilities, supplied quality seeds, breeds, and fertilizer, provided advanced technology, trained the farmers to handle the advanced technology, guaranteed the market for the agricultural products, provided subsidies, and motivated the younger generation to engage in the agricultural sector. The report also revealed that the country's total trade deficit was approximately Rs. 140 billion in the last fiscal year 2024/025 (MoF, 2025).

Figure 1

Five-year Trends of Foreign Trade



(MoF, 2023, p. III)

It is a very tragic situation that approximately 50% of the active population is engaged in the agricultural sector, yet agricultural products account for a higher share of imports in foreign trade statistics. Ignoring the ground realities of the nation, educational policies and practices have demotivated and discouraged the younger people from engaging in the agricultural sector, which is the backbone of the country's economy. The younger generation becomes uninterested in engaging in agriculture because, from the very beginning of schooling, they were and are still taught that being involved in agricultural sectors means being uncivilized and unintellectual,

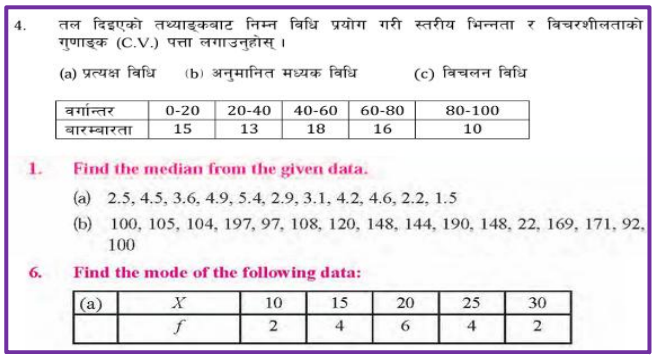
resulting in a high migration rate of 15.2% of the economically active population (NSO, 2023). The economically active population migrates from rural to urban areas and urban to abroad in search of prestigious jobs, hoping to achieve social status. The consequence is that approximately one-fourth of the agricultural land remains uncultivated (NSO, 2024). It has multifaceted effects on trade, the economy, and employment; unfortunately, these realities, which reflect the Nepal's socio-economic situation, have rarely been the subject of discourse in ME. There was a possibility of including these subjects in ME within the content areas of the profit and loss, percentages, fractions, and descriptive statistics, and many more linking ME to real-world scenarios.

Students have not had an opportunity to engage in the discourse of the socio-economic and political landscape of the country through mathematics because our ME practices focus on dry, raw, isolated, and decontextualized mathematical content (see Figure 2 & 3) and disempowering pedagogy (Ernest, 2008; Lamichhane, 2022; Luitel, 2013). Students often remain ignorant of socio-economic and political issues, thereby developing neutral attitudes. Such practice, in turn, underpins the non-transformative and stereotypical ME that only enhances instrumental and procedural understanding (Haapasalo & Kadijevich, 2000; Skemp, 1976).

An instrumental understanding conceals the socio-economic and political dimensions of ME because it relies on disciplinary egocentrism (Connor et al., 2015). The disciplinary ecocentrism further focuses on enriching disciplinary knowledge and skills, often at the expense of real-world problems and people's lifeworld. As shown in figures 2 and 3, students at the school and university levels are asked to solve the bookish questions that lack contextual connections and real-world scenarios. It focuses solely on a lock-step algorithm without providing conceptual, relational, cultural, or critical understanding (Lamichhane, 2021; Taylor & Taylor, 2019). Without having these attributes in pedagogical activities, they become decontextualized, apolitical, and asocial (Gutiérrez, 2013; Lerman, 2000), thereby

Figure 2

Mathematical Contents in the School Mathematics



4. तल दिइएको तथ्याङ्कबाट निम्न विधि प्रयोग गरी स्तरीय भिन्नता र विचरशीलताको गुणाङ्क (C.V.) पत्ता लगाउनुहोस् ।

(a) प्रत्यक्ष विधि (b) अनुमानित मध्यक विधि (c) विचलन विधि

वर्गान्तर	0-20	20-40	40-60	60-80	80-100
बारम्बारता	15	13	18	16	10

1. **Find the median from the given data.**

(a) 2.5, 4.5, 3.6, 4.9, 5.4, 2.9, 3.1, 4.2, 4.6, 2.2, 1.5

(b) 100, 105, 104, 197, 97, 108, 120, 148, 144, 190, 148, 22, 169, 171, 92, 100

6. **Find the mode of the following data:**

(a)	X	10	15	20	25	30
	f	2	4	6	4	2

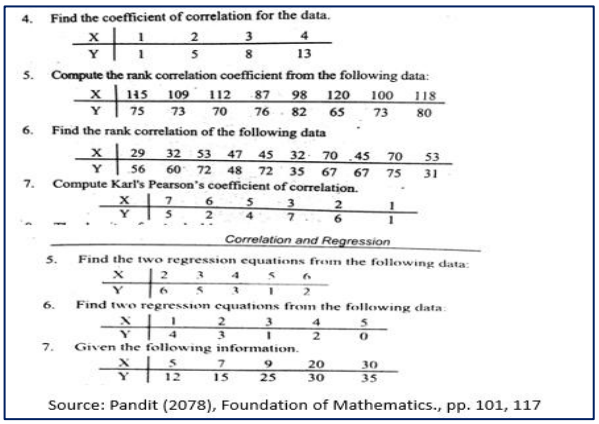
(CDC, 2018, p. 286, 2023, p. 257)

discouraging the learners from creating discourse on social inequality, economic disparities, asymmetric power distribution, and other un/visible oppressive forces in the mathematics classroom (Abtahi & Planas, 2024).

Moreover, the disciplinary egocentrism and its accompanying instrumentalist pedagogical approach support maintaining the 'status quo' because they enrich the conception of 'taken-for-granted-assumption' as mathematical reality and knowledge that do not teach students to raise the questions against the oppression perpetuated in a society, nation, and the world at large (Freire, 2005; Tutak et al., 2011; Giroux, 2020a). The consequences are that mathematics teaching and learning activities seem to be a journey through a dark tunnel, in which students are restricted from meaningful engagement with the social, cultural, political, and ecological dimensions of mathematical knowledge, skills, and concepts. Students are deprived of false consciousness (Freire, 2005) and become uncritical consumers of knowledge. In this context, I have some pressing questions. Why does our education system fail to align with national priority sectors? What are the reasons for incorporating discriminatory and disempowering content and pedagogy in education? Whose interests are being served? Are the Nepali people who belong to traditional occupations illiterate and uncultured?

Figure 3

Statistical Contents in the Foundation of Mathematics for B.Ed. First Year (TU)



4. Find the coefficient of correlation for the data.

X	1	2	3	4
Y	1	5	8	13

5. Compute the rank correlation coefficient from the following data:

X	115	109	112	87	98	120	100	118
Y	75	73	70	76	82	65	73	80

6. Find the rank correlation of the following data

X	29	32	53	47	45	32	70	45	70	53
Y	56	60	72	48	72	35	67	67	75	31

7. Compute Karl's Pearson's coefficient of correlation.

X	7	6	5	3	2	1
Y	5	2	4	7	6	1

Correlation and Regression

5. Find the two regression equations from the following data:

X	2	3	4	5	6
Y	6	5	3	1	2

6. Find two regression equations from the following data:

X	1	2	3	4	5
Y	4	3	1	2	0

7. Given the following information.

X	5	7	9	20	30
Y	12	15	25	30	35

Source: Pandit (2078), Foundation of Mathematics., pp. 101, 117

Who are Literates?

From June 5 to 22, 1991, the CBS, an authorized agency of the Government of Nepal (GoN), conducted the fifth national census. It could be any day between June 5 and 22, 1991. I waited for my School Leaving Certificate (SLC), now called the Secondary Education Examination (SEE) result. Two enumerators arrived at my home to collect the data; they were none other than my school-level teachers. My parents were busy preparing the paddy seedbed. The enumerators encouraged me to read all the questions carefully and asked me to provide the relevant information. I was not satisfied with the question about the literacy status of people living in rural areas of the country. I was not familiar with the formal definition of literacy. According to them,

those who can read, write, and perform basic arithmetic operations are regarded as literate. I thought that a team of experts developed these questionnaires. I had not dared to raise the questions on these questionnaires because the enumerators were my teachers. They seemed to hurry to complete the enumeration. To my knowledge, I provided the information, and they filled out the form.

Now, when I remember these events, I have some propelling questions. How can we claim that people with various skills and knowledge are illiterate? Does the literary concern only one reading, writing, and arithmetic? Do these scales suit the Nepali social, cultural, and educational landscape? As an insider, I have observed very closely that those people who are labeled as illiterate have the "skills of making everyday things—*Halo* (plough), *Juwa* (yoke), *Kodali* (hoe), Ghatta (a grinding water mill), *Dhoko* (bamboo basket), *Bhakari* (a large basket for storing grain), *Gundri* (a mat made by straw), *Syakhu* (bamboo knitted umbrella) and many more" (Lamichhane & Luitel, 2023a, p. 11). Likewise, they possess the skills and knowledge of plant crops, harvest and preserve them, farm livestock, poultry farming, beekeeping, and engage other related activities. Moreover, people have their own methods for counting and measuring land, objects, and crops, even though these skills and knowledge are primitive and need to be advanced (Shrestha, 2008). Why are these people labeled as illiterate?

The above discourse has inspired me to explore Nepal's education system in general and ME in particular. I came to understand that ME from the beginning of the so-called modern education is structured to marginalize the people (Jorgensen et al., 2014) residing in the countryside because it has not recognized their knowledge, skills, and ways of knowing as worth to include in formal educational discourses (Lamichhane & Luitel, 2023a; Luitel & Taylor, 2007). When such discriminatory and dominating practices are not challenged, they help preserve the 'status quo' in educational institutions, society, and nation, thereby suffering from various kinds of oppressions—socio-cultural discrimination, epistemic injustices, economic disparity, and linguistic erasure, to name but a few (Fricker, 2007; Phyak, 2021; Regmi, 2023; Wagle et al., 2019). In this context, many researchers (Awasthi, 2011; Minthorn & Chavez, 2015; Poudel et al., 2022; Wagle, 2021) argue that under the guise of modern education, Nepal imported the British-Indian educational model, which was deeply influenced by colonial ideologies that fundamentally ignore socio-economic, cultural, lingual, and educational realities of the country, supports displacing native knowledge,

skills, and epistemology. Before the Western modern influence, the education system, in general, and ME, in particular, were grounded in Nepali soil, culture, and perspectives (Lamichhane & Luitel, 2023a; Wagle, 2021).

The disintegration of local knowledge, ways of knowing, and values in educational discourse has led to an overreliance on the Western-Eurocentric educational model, which not only undermines Nepali educational practices but also inculcates an inferiority complex among educators, policymakers, and bureaucrats (Regmi, 2021b). The consequence is that it helps create and perpetuate a false narrative of unscientific, inconsistent, and unproductive regarding the existing Nepali education system, which degrades the historical, cultural, and ethnic heritage of the Nepali people. Educational institutions have gradually adopted Western-Eurocentric, monolingual, and neoliberal values that invisibly commodify and thingify education, thereby furthering its commercialization and privatization (Regmi, 2021b). These attributes of education differ significantly from our lived experiences of education and from an engaged collaborative learning approach (Wagle, 2021). Its effect is that the education system, in general, and ME, in particular, become isolated from the country's sociocultural, historical, and political milieu. The Nepali elites who were and are still in the ruling class rein the education system. They were trained and indoctrinated by the colonial power—British-American colonial and imperial perspectives —and thus failed to frame the education system within Nepali soil, culture, and perspectives (Regmi, 2021b). Education becomes a tool to suppress Nepali culture, and onto-epistemic perspectives further promote colonial ideology (Lamichhane, 2024; Luitel & Taylor, 2007; Sah, 2021), often operating invisibly as a hidden curriculum (Apple, 2019; Pinar, 2004).

Figure 4

Daily Uses Apparatus Made by Nepali People

(Lamichhane & Luitel; 2023a, p. 14)

The hidden curriculum indoctrinates value-free and universal perspectives in the guise of mathematical certainty, accuracy, and scientific logic (Ernest, 2016a;

Luitel, 2013), and later becomes a powerful secret weapon of cultural imperialism that insidiously instigates the neocolonial agendas (Bishop, 1990). The consequences are that mathematics practitioners (including myself) have been held captive in such a way that they have begun to think, act, and adopt other perspectives, and forget their own rich social culture, values, and history (Shrestha, 2008).

Do We Have No History?

Back in 1998, I was a second-year master's student in the Faculty of Education at Tribhuvan University (TU). I had an opportunity to read the course, Math IV: Foundation and Historical Development of ME (see Box 5). The course covered the historical development of mathematics in various civilizations, from ancient to modern periods. Initially, I became very eager to engage deeply in the course. I expected it to be similar to the history of Nepal taught in grade eight. Many stories illuminated the unparalleled bravery of our ancestors in protecting our national sovereignty and identity. These stories implicitly made us proud to be Nepali citizens and encouraged us to contribute to the national prosperity and development. It played a significant role in fostering national solidarity. Even after school time, we (students) used to discuss the tales and bravery of our ancestors.

इमा मेऽअग्नऽइष्टका धेनवः सन्त्वेका च दशं च दशं च शतम् च शतम् च सहस्त्रं च सहस्त्रं चायुतं च चायुतं च नियुत् च नियुतं च प्रयुत् चार्वुदं च न्यर्बुदं च समुद्रश्च मध्यं चान्तंश्च परार्द्धश्चैता मेअग्नऽइष्टंकाधेनवः सन्त्वमुत्रामुष्मिँलोके । (यजुर्वेद १७ :२)

Literally, the counting system found in the Yajureveda Sambita were; Eka, (1), daśa (10), sata (100), sahasra (1000), ayuat (10,000), niyuat (1,00,000), prayuta (1,000,000), arbuda (10,000,000), nyarbuda (100,000,000), Samudra (1,000,000,000), Madhya (10,000,000,000), anta (100,000,000,000), Parárdha (1,000,000,000,000)

Box 2 *Counting System Found in Yajurveda, 17. 2*

Over time, I had not had the opportunity to engage in such discourse. I had eagerly awaited the end of the course, hoping to explore Nepali ME practices; however, my expectations were dashed when our teachers announced that our course was finished.

I raised some questions, my voice trembling. Sir, why does our course not include the history of the development of mathematics in Nepal? Why has our university not offered a course on the history of Nepali Mathematics? Do we have no history? My professor smiled faintly and replied,

to the best of my knowledge, that there is no such history of Nepali ME that has attained such a rigorous level as to warrant its inclusion in university curricula. After enrolling at Kathmandu University (KU) in 2015 to pursue a Master of Philosophy (MPhil.) in ME, I had the opportunity to engage in the social, cultural, and political dimensions of ME. This course helped me understand how social, cultural, lingual, and power dynamics of society, nation, and the world have influenced educational policy, curricula, pedagogies, and assessments; however, an unfortunate aspect was that even in this course, there was no specific course devoted to the development of ME in Nepal. In this context, Lamichhane and Luitel (2023a) argue that it is one of the tragic conditions for Nepali ME, in which students remain ignorant of their own socio-cultural and historical practices of mathematics after receiving a postgraduate degree from the university. Why does such a tragic state have to bear on the Nepali ME program? It becomes one of the starting points of my inquiry.

अष्टौ लोकसहस्राणी अष्टौ श्लोकशतानि ।
अंह वेद्मि शुको सञ्जयो वेति वा न वा ॥
।महाभारत अदीपर्व, १.१.८१–१.१.८२।

Literally, there are eight thousand world and eight hundred verses. These I try comprehend; whether the well-trained Sukra and Sanjya know them or not.

(In Mahabharat, Aadi Parwa (1.1.81-1.1.82)

Box 3 *Counting Found in the Mahabharat, Aadi Parwa*

The cumulative effect of the above experiential experiences made me more contemplative about the history of Nepali mathematics. I found that it became popular when Shankar Raj Pant, one of the prolific Nepali scholars, wrote a paper titled "Mathematics in Nepal: A historical analysis", published by the Ministry of Science and Technology (Pant, 2004). After that, many scholars in mathematics (Acharya, 2016; 2017a; Lamichhane & Luitel, 2023a; Maskey, 2013; Raikhola et al., 2020; Shrestha, 2008) have explored the historical development of ME. The consequence is that many Nepali universities—TU, KU, and Nepal Sanskrit University have incorporated the historical development of mathematics in Nepal at the bachelor's and master’s levels. But it seems insufficient to explore its multidimensional aspects, as the history of mathematics education is presented informatively, dating events without being rigorously linked to the nation's social, cultural, economic, and political dimensions (Lamichhane & Luitel, 2023a).

Moreover, I found that the mathematical practices of the *Himavat Khanda* (South Asian subcontinent) trace back to the Vedic period, known as Vedic mathematics. Vedic mathematics refers to the ancient system of mathematics contained in the Vedas, particularly in the Sulvasutras. It contained 16 Sutras and 13 Sub-Sutras (see Figure 5). A rigorous development of mathematics during the pre-historical era at the *Himavat Khanda* was further evidenced by the counting numbers found in the second mantra of the seventeenth chapter of the Yajurveda (see Box 2). Likewise, it was also revealed in the *Aadi Parva* (see Box 3) and *Sabha Parva of the Mahabharata* (see Box 4). This evidence indicates the development and practices of mathematics in the prehistoric and epic eras of the South Asian subcontinent. The consistent use of the base-ten numeral system and large number names in these documents indicates a rigorous development of mathematics, which is also a symbol of well-developed human civilization in this region.

अयुतं प्रयुतं चैव शङ्कु तथर्वुदम् ।
खर्व शङ्ख निखर्व च महापद्मं च कोटाय ॥

(सभापर्व, महाभारत, २:८८.३)

Literally, ten thousand (ayuta), one hundred thousand (Prayuta), one million (Sanku), and ten million (Arbuda), one hundred million (Kharva), one billion (Sankha); one hundred billion (Nikharva) and the great Padma (Mahapadam), these are the measure of the Koti.

Box 4 *Counting Found in Shava Parwa, Mahabharat*

Likewise, the *Brahmi* numeral system (3rd century B.C.E.) has been found in Nepal, as evidenced by the *Asokha* pillar in Lumbini. The numismatic inscription explored the Ranjan numeral system, which dates to approximately 199 BC (see Appendix I). It was written in the *Ranjana* script (Nepal Bhasa/Newari language) and gained popularity from the 11th century onward, remaining in use in Nepal until the mid-20th century (Acharya, 2017a). This numeral system significantly contributes to Nepal's identity, as recognized by the UN when Nepal applied for membership. In addition, the *Lichhavina* numeral system was found to have been used in Nepal during the *Lichhavi* regime, from 576 to 880 AD (see Appendix II). Due to variations in the notation of *Lichhavian* numerals, they resemble the 3rd-century B.C.E. Brahmi numerals and the 14th-century B.C.E. Shan dynasty numerals. This number system used different letters for 1 to 9, with various letters assigned to each tens place (10, 20, …90), and a separate letter for 100 to 900, with or without unit symbols for 1 to 9. It is

found that the system is based on the decimal number system and uses both additive and multiplicative natures (see Appendix III).

The above evidence clearly indicates the development of numerical systems and mathematics in Nepal from prehistoric times; however, Nepal has not been able to preserve its historical legacy. Why has such a situation occurred? Who is responsible?

Figure 5

16 Sustra and 13 Sub-Sustra of the Vedic Mathematics

Sixteen Sutras

1. एकाधिकेनपूर्वेण (Ekāddhikena Pūrevṇa)	9. चलनकलनाभ्याम् (Calana-Kalanābhyām)
2. निखिलं नवतश्चरमंदशतः (Nikhilam Navataścaramont Deśatah)	10. यावदूनम् (Yāvadūnam)
3. ऊर्ध्वतिर्यग्भ्याम् (Ordhva-tiryabghyām)	11. व्यष्टिसमष्टिः (Vyaṣṭtisamaṣṭih)
4. परा वर्त्यं योजयेत् (Parāvartya Yojayet)	12. शेषाण्यङ्केन चरमेण (Śeṣāṇyaṅikena Carameṇa)
5. शून्यं साम्यसमुच्चये (Śunyam Sāmyasamuccaye)	13. सोपान्त्यद्वयमन्त्यम् (Sopāntyadvayamantyam)
6. आनुरूप्ये शून्यमन्यत् (Ånurūpye) Śūnyarmanyat)	14. एकन्यूनेनपूर्वेण (Ekanyūṇena Pūrveṇa)
7. संकलनव्यवकलनाभ्याम्(Sańkalana-vyavakalanābhyām)	15. गुणितसमुच्चयः (Guṇitasamuccayah)
8. पूरणापूरणाभ्याम् (Pūraṇāpūraṇābhydām)	16. गुणकसमुच्चयः (Guṇakasamuccayah)

Thirteen Sub-Sutras

1. आनुरूप्येण (Anurūpyeṇa)	8. अन्त्ययोर्दशकेकपि (Antyayordasaképi)
2. शिष्यते शेषसंज्ञः (Śiṣyate Śeṣasaṇjńah)	9. अन्त्ययोरेव (Antyayoreva)
3. आद्यमाद्ये नान्त्यमन्त्येन (Ādyamādye nāntya-mantyena)	10. समुच्चयगुणितः (Samuccayaguṇitah)
4. केवलैः सप्तकं गुण्यात् (Kevalaih Saptakam Guṇyāt)	11. लोपस्थापनाभ्याम् (Lopanasthāpanābhyām)
5. वेष्टनम् (Veṣṭanam)	12. विलोकनम् (Vilokanam)
6. यावदूनं तावदूनम् (Yāvadūnam Tāvadūmam)	13. गुणितसमुच्चयः समुच्चयगुणितः (Gunitasamuccayah Samuccayagunitah)
7. यावदूनं तावदूनीकृत्य वर्गं च योजयेत् (Yāvadunam Tāvadnikrtya Vargańca Yajayet)	

(Tirthaji, 2015; as cited in Parajuli, 2019, p. 65)

I have realized that the mathematics education rarely recognizes the importance of history that mark us for life. In this regard, many research scholars (Lamichhane & Luitel, 2023a; Luitel & Taylor, 2010; Shrestha, 2008) mention that the so-called modern mathematics serves as a tool in the hands of colonial power, thereby consolidating their power and playing a dominant role (Joseph, 2011) and works as cultural imperialism (Bishop, 1990). Against these backdrops, I have formulated my research problem.

Statement of the Problem

ME in many underdeveloped and developing countries remains decontextualized because of the subjugation of the Western Modern Worldview

(WMW). It does not welcome alternative perspectives and knowledge practices, accusing them of not being 'world standard' (Luitel & Taylor, 2010). The WMW deliberately seeks to replace a sphere of local cosmological knowledge with universal knowledge, aiming to restrain critical inquiry, a form of dominant intellectual discourse (Babaci-Wilhite, 2019). The WMW infiltrated the curricula of countries in the global south and the tricontinental region (Asia, Africa, and South America [GSTR]) by providing technical, financial, and consultancy services across various sectors of the nation (Regmi, 2016). I have realized that the act of asserting independence of mathematical and scientific knowledge from cultural, historical, and social perspectives relies on the political domination of the powerful countries and colonial actors who take the authorship of knowledge production (Mchombo, 2019), in which students from the GSTR countries rarely see the connection between classroom mathematics and their lifeworld.

I was not taught to connect classroom mathematics to lifeworld problems, but I was urged to memorize and recite pure mathematics facts, knowledge, and concepts for the upcoming examination. It pushes the mathematics far away from the sociocultural and historical realities of the learners in which they grew up. As a teacher, I have also followed the same procedures and have not devoted sufficient time and activities to connecting mathematics pedagogy with students' lifeworld. The prevailing pedagogy in schools and universities rarely considers learners and their immediate environment as significant components of ME, thereby creating mathematical Othering (Abtahi et al., 2020).

Mathematical Othering prevents the relational, critical, and cultural understanding of mathematical knowledge, shrinking learners' horizons for critical, imaginative, and creative thinking and restraining them within the terrain of simple doers without reflection (Abtahi et al., 2020; Dewey, 2001). Reflection and inquiry-based curriculum practices have greater potential to connect classroom mathematics with real-world problems. Connecting mathematics with real-world problems, encouraging students to claim knowledge as their own (Stroud & Baines, 2019). However, a realist ontology, an objective epistemology, and a value-neutral stance of WMW-driven mathematics (Luitel, 2013) perpetuates the grounds for fostering the singular ideology of mathematical certainty (Ernest, 2016a).

The essentialist and foundationalist perspective of ideological singularity gradually indoctrinates Western values, norms, and practices across the rest of the

world (Andreotti, 2011). As a student, I used to think that mathematics is a universal and pure subject with specific rules, formulae, and procedures for solving bookish problems. Similarly, I feel proud to be a mathematics learner. I was not aware that I was being shaped by the WMW and began celebrating the ideology of singularity as the 'world standard'. I acquiesced to hegemonic culture due to the lack of critical discourse in ME (Greer & Mukhopadhyay, 2012). In this context, mathematics becomes a powerful cultural tool of cultural imperialism (Bishop, 1990) that underpinned the perpetuation of the dominant culture.

After seemingly ending direct political control and geographical encroachment in the 20th century, colonial actors have used economic, technological, educational, and political interventions backed by military power to perpetuate cultural hegemony (Gramsci, 1971). It becomes a powerful implicit colonial force that sustained the colonial regime (Said, 1978). Furthermore, in the name of providing financial aid, technical support, and expertise services in the field of education, colonial actors have created a vicious circle of colonialism—condemnation, brainwashing, and conditioning (van Stam, 2017). I do not mean to oppose international cooperation and collaboration in education, but my primary concern is that the uncritical or blind adoption of the WMW-driven mathematics devalues local knowledge, culture, and practices, and we tend to forget our history as well.

The WMW-driven curriculum practices have instructed me (and, I suspect, others as well) to appreciate the essentialist and foundationalist nature of mathematics, which has not recognized others' knowledge, perspectives, values, and practices as worth in the academic milieu (Lamichhane & Luitel, 2022). Gradually, Western values and perspectives maintain their superiority in ME particularly, and in the broader social sphere, thereby reinforcing and indoctrinating the narrative that the West is the best (Koirala, 2021). However, our schools and universities rarely open a substantive discourse to challenge and disrupt the hegemonic presence of the West (Luitel & Taylor, 2010). The hegemonic presence of the West always enunciates a decontextualized curriculum, 'one-size-fits-all' pedagogy, and an externally imposed assessment system that prevents critical, creative, reflective, and imaginative thinking (Yusuf et al., 2017), further promoting colonial agendas.

In Nepal, from the very beginning of the introduction of the modern higher education system after the establishment of Tri-Chandra College, we have observed the direct or indirect influence of foreign policies and curriculum practices. In the

initial stage, the curriculum and content area were adopted from an Indian university, and mathematics classes were taught by foreign teachers from Bengal, a territory of the East India Company (Maskey, 2013; Shrestha, 2008). Similarly, after the establishment of the college of education, most of the curriculum materials were imported from the United States, and teachers were trained by foreign educators (Shrestha, 2008). It was the formal starting point of the Western system of teacher education that led us to forget to share our culture and experiences with our children; we had our tradition of ME as well (Shrestha, 2008).

The foreign-style teacher education and training programs began to play a dominant role in the history of mathematics education in Nepal. During that period, most curricular materials, textbooks, and content were imported and taught uncritically, and they are still being taught in Nepal, which plays a significant role in preparing the ground for fostering decontextualized and exclusive WMW-driven ME (Shrestha, 2008). In my opinion, it is impossible to remain isolated from contemporary international discourse during policy planning and the preparation of curricular materials; however, uncritical importation of foreign policies, curricula, pedagogical approaches, and assessment systems certainly creates havoc in an educational institution. It gradually distorts our socio-cultural, historical, linguistic, and ethnic diversities, which are major constituent factors in both education and sustainability (Taylor & Taylor, 2019). As a cultural insider witness to the ME in Nepal, I found that, through the implementation of the so-called modern ME, most of our historical and cultural practices and experiences have been highly devalued, and pushed to the edge of extinction (Lamichhane & Luitel, 2023a).

Before implementing the so-called modern education, there were different types of education systems, namely, *Vedic Education* (*Gurukul, Devakul, Pitrikul, and Rishikul*), *English Pathashala, Sanskrit Pathashala, Gumba Pathashala, Bhasa Pathashala, Shresta Pathashala, Aadhar Pathashala***,** etc., in Nepal (Poudel et al., 2005). They had different curricula practices in which various subjects and contents were included according to the needs and professional requirements of contemporary society. Although it had some features of decentralization and contextualization, it could not become inclusive. Most curriculum practices based on the hierarchical caste system and the so-called *Sudra* (untouchable) caste were not allowed in education (Poudel et al., 2005). It is one of the most shameful practices in education; some of its footprints can occasionally be seen in the countryside.

To my understanding, there is no formal mathematics curriculum; however, ME seems somewhat inclusive, contextual, and developmental. It was at a primitive stage and needs to be enhanced (Lamichhane & Luitel, 2023a). Rather than enhancing and developing our own educational system, our universities and schools uncritically adopt foreign mathematics (Luitel, 2009). The formal education system, after the NNEPC (1956), the first educational plan of Nepal, has not recognized most of the textbooks and other locally available resources as curricular materials. The so-called modern education seemed highly brutal toward indigenous knowledge and languages. It had been justified by the statement made by the educational advisor of NNEPC, Hugh B. Wood, "the study of non-Nepali local languages would mitigate against the effective development of Nepali. ……. If the younger generation is taught to use Nepali as the basic language, then other languages will gradually disappear, and greater national strength and unity will result" (NNEPC, 1956, p. 97).

In my experience, language is not simply a tool of communication; it is one of the most important means of social recognition and plays a significant role in the inquiry and learning process across every sector of society. In this connection, Thiong'o (1986) argued that the military forces and bullets could work for physical subjugation, whereas linguistic genocide remains in the core of the colonial and neocolonial projects, which help to subjugate all aspects of social and personal lives.

In Nepal, it was initially started from the Nepali-only medium of instruction, which gradually turned into the English-only medium of instruction, influenced by Macaulay's Minute language policies that had been indoctrinated by the British government to its colonial state India for the expansion of imperialist ideology in the South Asian sub-continent (Awasthi, 2004). Many researchers, writers, and educators (Awasthi, 2004; Bista & Gaulee, 2018; Shrestha, 2008; Sing, 2015) have argued that the education system of Nepal is influenced by the British-Indian education system and other western countries and/or donor agencies in which they have inculcated their values, ideology, and standards in the name of providing economical aids, technological assistance, and supplement of expertise (Regmi, 2021a).

In my understanding, in the name of providing modern education, we have continuously experienced domination of the so-called alien ideology (Awasthi, 2004). It devalues our local indigenous practices, textbooks, languages, pedagogical approaches, and socio-cultural heritages, hindering the evolution, creation, and recreation process of our education system. As a cultural insider and practitioner of

ME, I have felt that the curriculum, pedagogical, and assessment practices adopted in Nepal urge students to become uncritical followers of the Western-modern hegemonic ME (Luitel & Taylor, 2019). From this discourse, I realize that ME in Nepal needs to be revitalized through postcolonial discourses (see Chapter II) that would help recognize an inclusive ideology, holistic pedagogy, and transformative assessment practices beyond the essentialist and foundationalist paradigms.

The foundationalist approach to curriculum development relies on a realist ontology and an objective epistemology, leading to transmissionist pedagogical approaches and disempowering assessment in ME (Lamichhane, 2017), in which mathematical knowledge is regarded as independent from social, cultural, and political aspects. In this regard, I have questioned the very foundations of realist ontology, objective epistemology, value-neutral axiology, and scientific logic, thereby breaking the pre-assumed primacy of Western language, knowledge, and worldview from a postcolonial perspective. It helps broaden alternative perspectives in ME by breaking the vicious circle of disciplinary egocentric curricula, transmissionist pedagogy, and victim-blaming assessment systems in education (Luitel & Taylor, 2010; Takayama et al., 2017; Tarc, 2018).

The postcolonial perspective not only advocates socially just practices but also adopts an inherently interdisciplinary stance that transcends the narrow confines of particular disciplines to solve real-world problems. It also helps develop critical consciousness and contribute to liberating human subjectivity from Western discourse, logic, and aesthetics (Tarc, 2018). Likewise, a postcolonial perspective is worth considering to liberate ME from colonial influences and to recognize local indigenous knowledge, values, and perspectives, which might serve as the starting point for inclusive education.

In Nepal, inclusive ME plays two significant roles simultaneously. Firstly, it supports exploring corrosive forces that restrain ME within the narrowly conceived ways of imparting mathematical knowledge. Secondly, it needs to envision an alternative ME in which multiple perspectives and diverse onto-epistemic practices have flourished. It can/should offer students and teachers the opportunity to engage in pure and free discourse that makes mathematics mindful and lively (Taylor & Williams, 1992). In so doing, it is necessary to avoid a reductionist linear mode of teaching, one-way communication, an autocratic classroom and institutional atmosphere, one-directional enculturation, and a one-size-fits-all approach

(Lamichhane, 2019; Luitel & Taylor, 2010). Un/knowingly, such a pedagogy welcomes and adopts the Western-Eurocentric mathematics. It has no bearing on students' lived experience. It becomes one of the most powerful weapons in imposing Western culture, empowering elites and stifling critical and imaginative thinking and creativity (Rizvi et al., 2006). Moreover, these practices regard education as a means of external recognition, indoctrinating students into an externally mandated, centralized assessment system as the only way to assess their learning outcomes.

Assessment practices in ME seem unproductive; they have contributed to the erosion of learners' creative potential (Ehtiyar & Baser, 2019). In my experience, the central problem with the assessment system and its guiding instructional activity is that they encourage teachers to focus their teaching and learning on disseminating silos of mathematical facts, treating students as passive recipients. Such a disembodied assessment system has not enabled students to develop critical thinking, problem-solving, and decision-making skills. Here, my argument is that silos of mathematical knowledge are not necessarily bad; however, overreliance on them prevents communication, collaboration, inquiry, creativity, and effective engagement in learning (Pennington et al., 2013) and thus mathematics remains an obscure discipline (Lamichhane, 2019).

In modern ME, an educated person is expected to master specific facts, knowledge, propositions, and lockstep algorithms without due consideration of other aspects of learning that support the separation of learners' cognitive development from the sociocultural contexts (Babci-Wilhite, 2019). An externally mandated, centralized assessment seems to ignore learners' holistic development. It has rarely considered cognitive, affective, social, emotional, and spiritual dimensions of learners and rejects the notion of learning as the process of knowing, being, and doing (Stetsenko, 2017). This notion of assessment of learning seems to focus solely on externally pre-designed 'world standard' to determine the status of students' learning.

In this connection, I have felt that with the help of modern science and technology, many assessment tools have been developed and claimed to measure seemingly unmeasurable attributes of learning and learners, which, in turn, provide the ground for circulation of the colonial legacy and its imperatives (Giroux, 2011; Lamichhane, 2024). At this point, I have realized that the central problem of our ME is the adoption of a WMW-driven curriculum, an uncritical pedagogy, and an assessment system that legitimize and validate WMW. It has restrained us within cultural

reproduction as a form of ME that urgently needs to be challenged and should offer an alternative, inclusive ME that respects other knowledge, ways of knowing, perspectives, and values. In this regard, I have set the following purpose to navigate my inquiry.

Purpose of the Study

The purpose of the study is to explore the colonial legacy embedded in Nepal's ME and to envision an empowering ME in Nepal.

Formulating My Research Questions

From the above discourse and the purpose of my inquiry, I have formulated research questions to address these issues that guide my inquiry, which are informed by three broad metaphors: the winner-takes-all approach to curriculum; pedagogy as/for developing false consciousness; and assessment as/for instigating marginalization. Now, I have briefly described how these metaphors helped formulate research questions.

Winner-Takes-All Approach of Mathematics Curriculum

During my academic and professional journey in ME, I have witnessed that mathematics curricular practices in schools and universities have been dominated by the eidos paradigm, which primarily regards the curriculum as an end in itself. The end metaphor describes the curriculum as a sacred running track to reach a fixed destination as quickly as possible, without considering the immediate environment, emerging situations, and the learner as the subject of becoming (Yu, 2009). It focuses on the mastery paradigm in which teaching-learning activities are restrained within instrumental and mechanical rules and algorithms for solving bookish questions (Lamichhane, 2019; Manandhar et al., 2022; Skemp,1976).

The mastery paradigm of curriculum orients teaching and learning activities towards expert-driven standards that clearly mirror the cultural homogenization that subordinates Other cultural practices (Pinar, 2004). Educational standardization adversely affects teaching and learning because it restrains within cultural reproduction (Schubert, 1986) and, over the long term, restratifies society and education in favor of the minority elite. In this sense, the standardization of the curriculum without consideration of the people's sociocultural and historical practices, ways of knowing, and values endorses cultural assimilation (Pinar, 2004), cultural imperialism (Bishop, 1990), and cultural hegemony (Gramsci, 1971). It indicates that the modern school appears to be an intolerable institution because it normalizes the

Western-Eurocentric thought and neoliberal domination in which equity and inclusion are rarely possible (Ball & Collet-Sabé, 2025). Likewise, the Western-Eurocentric conception of education creates unethical binaries—who wins and who loses, who is superior and who is inferior, whose knowledge is worthy and whose knowledge is disrespectable, and many more that instill injustice in schools, societies, nations, and the world at large (Foucault, 1979). In this context, modern schools, not surprisingly, resemble prisons (ibid) that rarely educate people (Kemmis, 2008) but instead train people in a general method of serialization and normalization that functions to render them describable individuals for the interests of their neoliberal masters (Maldonado-Torres, 2018).

The modern neoliberal sociopolitical and economic policies, the latest iteration of colonialization and imperialism with revamped forms of oppression, systemic structure of social injustices, and economic disparities, do nothing but create an educational exclusion of the majority-minoritized groups (Ball & Collet-Sabé, 2025; Brown, 2015; Lewis, 2018). It signifies that modern neoliberal educational practices—educational polices, curricula, pedagogies and assessment systems are the continuation of a new mutational form of colonial education create a false metanarrative through deployment of military power and ultra-modern weapons at the beginning of the colonial period and utilizing techno-cultural tools, financial aids, consultancy services and language in the recent decades after 1950s to perpetuate subjugation and subordination of the people of GSTR (Ball & Collet-Sabé, 2025; van Stam, 2017). In this scenario, Lather (2010) argues that neoliberal sociopolitical policy is a fertile land for emanating and perpetuating a dangerous form of hegemonic culture of educational practices and knowledge that can easily take consent from majority-minoritized groups of people to squash their worldviews, ways of knowing, and being by means of creating the falsified narratives.

The disempowering metanarratives of colonized and non-colonized countries and their people perpetuate the notion that they were outside of history and make a distinction between the fully human—Western-European clans —and other humanity, labeled sub-human, and the non-human (Maldonado-Torres, 2018). We are taught that there are the right theories about how to represent the world and how it works, and there is only one right way to know the world in which other ways of knowing are dismissed and erased (Dillard, 2012). It signifies that modern education has historically been used as a powerful weapon to colonize minds, to erase the native

ways of knowing and being in the world, and acculturate the people of the GSTR to the ways of colonizers (De la Garza, 2003). Moreover, research in the social sciences underpinned by the colonial paradigm has also been used as a tool of social control, serving to justify and legitimize the perpetuation of the colonial legacy (Santos, 2016). In this context, Santos (2016) argued that neocolonial educational practices create a metanarrative of

> social regulation in the name of social emancipation, appropriation in the name of liberation, violence in the name of peace, the destruction of life in the name of the sanctity of life, societal fascism in the name of political democracy, illegal plundering in the name of the rule of law, assimilation in the name of diversity, individual vulnerability in the name of individual autonomy, constitution of subhumanities in the name of humanity, putting price tags on convictions in the name of priceless values, commodification in the name of redemption, standardization in the name of choice and massification in the name of freedom. (p. viii)

At this point of inquiry, I have realized that the mastery paradigm of the curriculum has not only mitigated the roles of emerging and evolving situations, practitioners' beliefs, subjectivities, and sociocultural diversities but also has regarded these attributes as catastrophic obstacles to attending the pre-determined objectives within a stipulated timeframe (Paraskeva, 2016; Yu, 2009). The mastery model of curriculum relies on rational thinking, deductive reasoning, and scientific logic (Luitel, 2018). It restricts teachers and students from rejoicing in their learning in their own ways, at their own pace, at their own time, and in their own scenery. Isolating mathematics from the culture, history, and political milieu in which learners grew up, and preventing the use of autonomous scholarship in learning, makes mathematics decontextualized and highly impersonalized. Curriculum practices aim to legitimize hidden neocolonial and neoliberal interests that suppress local knowledge, native languages, and ways of knowing and doing (Desai & Gaztambide-Fernández, 2013) and hegemonic cultural values, structural hierarchies, and inequalities (Patrick, 2025) by means of instigating modern education in general and science and ME in particular (Skovsmose, 2004).

If we examine the historical development of mathematics, we find many scholars who have contributed to various fields and written mathematics textbooks (Acharya, 2017b). However, rare historical evidence showed the use of these

mathematical contents and textbooks in formal education. Through prolonged practices of decontextualized and imported curricula and textbooks, our educational process has been overpowered by WMW and neoliberal policy, which has led us to not only forget our rich bio-cultural diversities but also to provide high priority to invasive cultural practices that help distort our socio-historical, cultural, and educational perspectives (Luitel & Taylor, 2010). What does it indicate? Why have these mathematical textbooks (written by Nepali writers) not been recognized as authentic resources?

As a student, teacher educator, and practitioner-researcher, I have experienced that externally recognized and implemented mathematics curricula create a massive rift between classroom mathematics and real-world problems. It is likely to foster the absolutist views of mathematics that largely adopt the dualist view of reality (Ernest, 1991). The dualist view sees the world in two mutually exclusive perspectives: true or false, right or wrong, pass or fail, good or bad. These unhelpful perspectives seem dehumanize; however, these attributes are incorporated by the modern ME supports to enrich the essentialist concept of 'us good and them bad' (Ernest, 1991), which is one of the most precarious weapons that invokes the practitioners for developing disciplinary egocentrism (Connor et al., 2015).

The roots of egocentric thought in ME germinate from the neocolonial and neoliberal mindsets of the WMW, which orient toward controlling the world through the hidden interests of education in general and ME, in particular, grounded in economic imperatives and rationality (Rizvi et al., 2006). It ignores other forms of logic, such as narratives, metaphoric, poetics, etc. (Saldana, 2015). The neoliberal economic imperative agenda drives technically oriented mathematics curricula in schools and universities, intended to manage, control, and exploit natural resources (Habermas, 1972) and backward societies and nations (Alderidge & Kil Go, 2013). The overreliance on and over glorification of neoliberal attributes develop the conception of the winner-takes-all approach, which resembles the notion of social Darwinism (Tobach, 1972, as cited in Stroud & Baines, 2019).

The metaphor of social Darwinism in my inquiry indicates the juggernaut of the Western-Eurocentric perspective and its aligning curricula, pedagogies, and assessments in ME that engulfs whatever is in its path and thus helps generate the homogeneous world in general and universal modern ME in particular that are far from the lifeworlds of the people of GSTR (Gullion & Tilton, 2020). It is not

surprising that the GSTR countries and their people rarely have the chance to pick and choose what they find palatable in their sociocultural, historical, and political milieu, because of the indoctrination of the Western-Eurocentric framework for judging the worth of educational values and outcomes. Over time, the colonial power center has employed seemingly neutral strategies of financial aid, technological support, and scholarship programs for teachers, educators, researchers, and high-level bureaucratic officers. They have been trained by the Western-Eurocentric perspective, onto-epistemic practices, and values. They worked as the comprador intelligentsia (Luitel, 2009), who looked native in skin but white in taste and minds (Fanon, 1967; Poudel, 2022). Later on, they have reined in national policies and educational systems that do nothing but colonize the people's minds and bodies (Dillard, 2012).

Through the colonization of minds and bodies, people learn to forget that their ancestors have knowledge, onto-epistemic practices, and ways of living with the world (Apple, 2019; Shrestha, 2008; Smith, 2012). People who participate without understanding their social, cultural, and historical milieu cannot adequately grasp the meaning of education (Epstein & Carroll, 2005). Likewise, people failed to explore and thus ignore the underside of Western modernity—a mutational form of coloniality (Bhambra, 2014; Go, 2013; Quijano, 2007) and its intricate linkages to the winner-takes-all approach. The uncritical adoption of mathematics over an extended period of times generated a distorted and depoliticized understanding of the native onto-epistemic practices and ways of being with the world (Chen, 2010; Luitel, 2013) and people from the GSTR have un/knowingly given consent to be colonized and trapped in the hegemonic practices (Gramsci, 1971) that work as a non-transformative framework of the education (Craib, 1992; Rai, 2022). The non-transformative framework glorifies the current hegemonic structures through the stereotypical pedagogical practices that prepare fertile grounds to perpetuate monolithic culture, value, and ideology, which again support the neocolonial polities in education that become one of the powerful tools to seize the power of historically disenfranchised groups of people and countries (Rodriguez & Smith, 2013). It raised my first research question: how has the ME curriculum in Nepal been informed by colonial legacy, and how can my research participants and I envision an inclusive curriculum in Nepal?

Pedagogy as/for Developing False Consciousness

In my experiences as a student and a teacher educator, mathematics pedagogy seems to be prescriptive, guided by the notion of 'banking pedagogy' in which a

teacher acts robotically to fill the students' minds, as containers, with the knowledge that has been recognized and sanctioned by an authority as a potential to be learned (Freire, 1993). Externally endorsed and authoritatively legitimized mathematical knowledge, along with transmissionist and pouring pedagogy, gradually erodes learners' creative thinking and encourages them to become knowledge accumulators. Un/knowingly modern school promotes a pedagogical approach that is irrelevant to local cosmological knowledge, sociocultural values, and historically embedded ways of knowing and being (Wagle et al., 2019). Entering the schools means entering the other zones where particular knowledge, values, customs, and ideology are imposed as predefined, unique, and non-questionable attributes that relegate all other forms of knowledge, values, and ways of knowing and being (Dawson, 2020).

The modern-colonial epistemic (Ball & Collet-Sabé, 2025) focuses on enriching and justifying the taken-for-granted assumptions (Freire, 2005) as knowledge that not only underpins the social and epistemic injustice but also conceals the violence, wars, colonial hubris, economic disparities, and climate change **(**Maldonado-Torres, 2018) which are induced by Western-Eurocentric heroism (Mignolo, 2021). The colonial power instigates the insidious logic of the colonial civilization mission in postulating colonial projects in the South Asian subcontinent, where corrosive influences are still present in different sectors of the nation, including education (Gandhi, 2019).

For instance, supporting the European colonial project, Marx (1973) characterized the South Asian subcontinent as an Asiatic society that has no history at all, at least no known history, and thus class struggle is absent, which is the source of social progress. Moreover, Karl Marx (1973) in his famous treatise 'Surveys from Exile' wrote that "England has fulfilled a double mission in India; one destructive, the other regenerating—the annihilating of old Asiatic society and that laying of the material foundation of the Western society in Asia" (p. 234). It indicates that even socialism, postcolonial thinkers (Gandhi, 2019; Said, 1978) have argued, becomes part of the colonial adventure of the European spirit. As I have stated in many places in this study, the profound foundation of modern education in general and ME in particular is the Western-Eurocentric perspective that regards the students (people) from GSTR as the objects of manipulation that can be shaped as the interests of colonizers (Mignolo, 2021; Santos, 2014). To colonize the mindsets of the people from GSTR and instigate

the hegemonic culture in educational institutions, colonizers have been using ultrarational thinking in education.

The ultra-rational fabrication of mathematical knowledge fails to connect students' lifeworld experiences with classroom mathematics. It also misguides teachers to see the learner as incapable and unintelligent to learn and solve the real-world problems (Thapa, 2016) because they have already been deskilled by a highly bureaucratic and culturally reproductive mode of curriculum in which students' prior experiences and the immediate environment have been taken as the obstacles to the smooth operation of the schools (Grundy, 1987). Teachers have been mainly oriented to disseminate mathematical knowledge through a lockstep algorithm.

As I described in the previous section, ME practices are heavily guided by technical and economic imperatives, leading to the industrialization of education and reinforcing an instrumentalist conception of ME (D'Souza, 2023). Industrialization of education tries to establish and spread a mechanical, apolitical, and value-neutral conception of ME in exchange for a bit of economic benefit. It encourages teachers to adopt more standardized procedures rather than to interpret and relate mathematical concepts and knowledge to a broader sociocultural context (Kanu, 2003). Our ME practices have not even addressed the issues of economic and industrial imperatives, but have been oriented toward reproducing official mathematical facts, knowledge, and procedures, in the hope of gaining external recognition. According to Apple (1993)

> The politics of official knowledge works not through coercion but through accords and compromises that favor the dominant groups. Apple elaborates: these compromises occur at different levels: at the level of political and ideological discourse, at the level of state policies, at the level of knowledge that is taught in schools, at the level of the teachers and students in classrooms, and at the level of how we understand all of this. (p. 10)

Here, I do not want to argue against vocational and practical education, but I argue that, for the sake of preparing students for future industrial work, we should not ignore the agentive aspect of human beings that leads them to become 21st century citizens. As an insider practitioner, I have observed that the modern paradigm of scientism encourages the development of mechanistic, static, stereotypical, and naturalistic views of consciousness, which seem to ignore ethical dilemmas and how the global production, circulation, consumption, and power imbalance contribute to the

destruction of the environment (Taylor & Taylor, 2019). I do not mean that the Industrial Revolution played a negative role in ME; however, my arguments are that the Western-colonial educational system not only controls the mental universe of the people (Thiong'o, 1986) but also controls the environment for the benefit of some privileged groups and nations, which threatens the lives of other creatures and the planet as well (Khaksar, 2020).

There are covert and overt interests of the dominant groups, nations, big corporate houses, and owners of the industry behind the enactment of apolitical and value-neutral views of education (Patrick, 2025) that appeal to adopt a transmissionist pedagogy in mathematics and other subjects as well that complies the students with ongoing social structure and 'status quo' (Giroux, 2020a; Tutak et al., 2011). In this context, Noam Chomsky has argued that most of the learners have been lured by immediate economic and financial improvement (i.e., economic rationalism); however, in the long run, it works as a subordinate force that serves as a hidden interest for eroding the creative, explorative, and imaginative thinking (as cited in Robertson, 2013). The economic rationalistic view of education leads to the adoption of a highly romanticized view of existing knowledge and social functioning as an ultimate reality/truth, supporting the creation of a new form of hegemony that can be termed false consciousness (Habermas, 1989).

With the advent of WMW-driven science and technology, colonialist nations have strategically altered their ways of exercising and controlling other nations through physical forces and weapons (Maldonado-Torres, 2018; Rudolph & Brown, 2017; Takayama et al., 2017). The vested interests of colonialism have not been limited to the encroachment on land through the direct deployment of military forces and ultra-modern weapons, but have also begun to arbitrate in other aspects of state machinery, including education. With a vested interest in mind, colonizers have gradually indoctrinated their norms, values, and imperatives into our society and nation through modern curricula (Giroux, 2011; Maldonado-Torres, 2018**)**. In doing so, colonized countries have been suggested to introduce technocratic, rationalistic thought in education through the formulation and implementation of bureaucratic curricula and autocratic pedagogy, so that young generations can be indoctrinated with mechanistic, technocratic, and discrete knowledge and skills that will blandly support and maintain the social order. The uncritical endorsement and denial of any sociocultural, historical, and political practices can be taken as the product of false

consciousness developed through disempowering, mechanistic pedagogical practices in ME in particular (Alro & Hoines, 2016) and in the overall education system.

The false consciousness of transmissionist banking pedagogy (Freire, 2005) as the only pedagogical option has been germinated through the Western-Eurocentric construction of absolutism, objectivism, and neutralism (Giroux, 2018; Kemmis, 2008) and then spread throughout the society and nation at large, which has undesirable effects on social, cultural, and ecological spheres as well (Renert, 2011). In my experience, the major attributes of pedagogical practices that unintentionally foster the development of false consciousness have evolved through the adoption of monolingual educational policy, a dualistic view of mathematics, the post/positivist legacy of curriculum development, and centralized practices (Wagle et al., 2019). All of these attributes compelled me to become a seeker of the highest grade (marks), which only measures upper-middle-class knowledge, which is again owned by those in power and can be used to justify the dominant social, linguistic, economic, and cultural structures (Kincheloe, 2008). More precisely, the pedagogy of mathematics has not been able to break the seemingly neutral, apolitical, and ahistorical stance that un/knowingly incorporates the hegemonic imperative that prepares the ground for maintaining control and power over the learners so that they become an unconscious consumer of knowledge and help foster the false conscious mindsets (Paraskeva, 2016).

The development of false consciousness among learners has led them to believe in a single ultimate reality, objectivist epistemology, and value-neutral mathematical knowledge, thereby fostering a 'culture of silence' (Monchinski, 2008). It governs students to become mute followers, so they cannot raise questions about preexisting social, institutional, and cultural structures. The erosion of the questioning mind prevents creative, innovative, and imaginative thinking; thus, students become blind observers of the social, cultural, political, and institutional activities. In this context, Holt (2005), a renowned educator, has argued that school becomes a bad place for children because of its orientation toward mechanistic, static, and neutralistic views of consciousness that regard students as receiving objects, inhibiting an agentic aspect of learners. It again endorses the false consciousness among practitioners.

From this discourse, I realize that the concept of false consciousness may appear in two distinct spheres of my lifeworld. Firstly, it prevents me from perceiving the true nature of mathematical knowledge, its structures, and the relationships among different mathematical concepts and other disciplines. Mathematics pedagogy hardly

explores mathematical structures and their relationships within and other disciplines and real-world problems; instead, it motivates learners to acquire superficial knowledge, leading to the accumulation of discrete mathematical facts and concepts to prepare for upcoming examinations (Kemmis, 2008). Secondly, false consciousness prevents me from engaging with the social, cultural, and economic aspects of life through mathematical discourse, turning me into an external observer of unjust practices. These pedagogical practices in mathematics overlook the dialectical and dialogical relationship among different disciplines and sociocultural, historical, and political realities. Such pedagogical orientation has led me to memorize and retain the preexisting body of pure mathematical knowledge (Luitel, 2013) for reciting in the final examination to obtain the highest marks (grades). It also supports perpetuating the colonial legacy in ME (Lamichhane, 2024). At this stage, I have set my second research question: how colonial hubris informed pedagogical practices, and how we can envisage a futuristic pedagogy.

Assessment as/for Instigating Marginalization

As a student, teacher, and teacher educator, I have observed that our schools and universities mostly focus on time-bound paper-and-pencil tests administered by an external authority to measure students' learning. There is a growing debate in educational research about whether we can quantitatively measure students' learning status using a three-hour paper-and-pencil test. There are two contrasting views. The first group argues that it is possible to measure students' learning status quantitatively through highly standardized tests. In contrast, the second group claims that it is very difficult to assess students' learning status using standardized tests (Lamichhane, 2018). The externally executed on-sitting paper-pencil test is a form of assessment of learning which is mostly devoted to seeking the fault in students' works (Lamichhane, 2019), aiming to determine the ranking of students based on the marks they have obtained, rather than focusing on assessing the learning status of students for the overall improvement of the teaching-learning environment.

The assessment of learning isolates the knower from the known and enriches the concept of learning by doing without reflection (Dewey, 2001). A text-driven, norm-referenced approach to assessment has primarily been used for summative purposes, focusing on the recall of mathematical facts and knowledge. When teachers assess students primarily through tests, there is a high likelihood that they quickly conclude that other aspects of learning are meaningless (Shinidler, 2010). Likewise,

the assessment of learning becomes a tool for marginalizing the majority of learners because it primarily focuses on sharp learners from mainstream groups and posits the ideological and oppressive aspects of the exclusive education system (Sims et al., 2023). It turns out to be an aspect of globalization and colonization, governed by a neoliberal economy, that is far removed from the life worlds of people in disenfranchised countries (Skovsmose, 2007). In this context, I have a question. Why do our educational institutions incorporate the assessment of learning to assess the students' learning status?

I have rarely been assessed using an alternative approach during my academic journey, from the early years of education to the Master's degree level. Most of the time, I had taken externally imposed, centralized tests to assess my learning in mathematics and other disciplines. I found that the main objective of the assessment is to segregate students into two groups: fail or pass. At a glance, it seems like good practice in academia; however, it has a significant adverse effect on individuals' and society's lives. Those who are labeled as unsuccessful on particular tests are relegated to a marginalized group. It does not consider the multiple factors—access to educational resources, sociocultural belongingness, language of instruction, economic background, etc., that have explicitly affected the student's achievement in mathematics (Penuel & Watkins, 2019). The externally administered, closed-book, standardized, or teacher-made tests promote a dualistic view of right or wrong in learners and, by extension, in society, and neglects the social aspects of learning, thus contributing to the marginalization of students. In this context, the institution has used the assessment of learning as a double-edged weapon. On the one hand, it promotes the victim-blaming culture in which students are blamed for failure. On the other hand, it instigates epistemic injustices in mathematics by privileging certain ways of knowing that favour the minority mainstream group and excluding and marginalizing the majority disadvantaged group (Nieminen & Lahdenperä, 2024). In addition, assessment of learning further promotes competition and productivity rather than mutual, cooperative, and collaborative learning.

Competition and productivity carry implicit connotations in modern neoliberal education, a colonial form that employs the discourse of materialistic development to justify the project of 'cultural imperialism' in the GSTR countries, which aims to introduce privatization, economic disparities, and social injustice (Dei, 2019). The neocolonial and neoliberal modern education renders GSTR students and teachers as

underdeveloped human capital (Mignolo, 2002) that requires the colonizers' support and guidance to become fully human capital. Neoliberal education does not see teachers and students as agents of social transformation but as human capital, economic actors governable market metric (Attick, 2017). That is, neoliberal education regards teachers and students as objects to be sold in a competitive market. Competition may fuel global conflicts because it teaches people to be victorious over others and to capture as much economic capital and natural resources as possible for personal benefit (Shiva, 2005).

At this point, I become somewhat aware of the assessment system implemented from the very beginning of formal ME. In Michael Apple's view, testing alone does not capture the true essence of learning because the testing approach overshadows our curriculum and pedagogical practices, in which teachers merely serve as trainers and prepare students for tests (Nganga & Kambutu, 2013). Similarly, he argues that the conventional assessment system measures the attributes of learners required for industrial labour, enabling them to fit into appropriate cultural, economic, social, and political contexts (Nganga & Kambutu, 2013). The externally mandated testing approach of measuring students' learning outcomes is not only responsible for authenticating social injustices in educational institutions and society but also appears to be one of the most significant obstacles to fostering an authentic learning environment (Robertson, 2013; Shepard, 2000). Because of fear of failure, pressure to achieve good marks, unhealthy competition, and corporal punishment learners had insufficient opportunities to engage in constructive, imaginative, and creative activities (Shepard, 2000).

In external test-driven curriculum practices, rewards and punishments are the major factors motivating learners. It also supports creating a socially unethical hierarchy among learners. Test-driven practices become highly dependent on the teacher's knowledge, resources, and judgment rather than on developing students' ways of learning, sense of justice, and autonomy (Aldridge & Kil Go, 2013). In this context, I have realized that an externally imposed curriculum and a centralized testing approach, pervasive in ME in Nepal, contribute to a blaming culture in which no one is willing to take sole responsibility for, or ownership of, the programs' pros and cons (Luitel, 2009).

From the above discussion, the externally mandated and executed tests in ME not only contribute to creating marginalization and social exclusion but also push ME

into the street as an unclaimed entity. Arriving at this point, I have some pressing questions regarding the assessment system. Does the existing assessment system help to reform/transform ME? Is it useful for developing the learning culture in the mathematics classroom? Can it accurately assess or capture learners' actual learning status? All of these questions have led me to formulate my third research question: how colonial assessment practice shaped our ME, and how we can offer a transformative assessment system.

Overarching Research Question

How has the colonial legacy embedded in ME in Nepal, and how do my research participants and I construct a vision for inclusive ME in Nepal?

Subsidiary Research Questions

1) How has the ME curriculum of Nepal been informed by colonial legacy, and how can my research participants and I envision an inclusive curriculum in Nepal?
2) How have my research participants and I experienced a colonial pedagogical legacy in a journey of ME, and how can we envisage a holistic pedagogy?
3) In what ways does the colonial assessment system of ME restrain us within a unidimensional-standardized form, and how can we (my research participants and I) offer a transformative assessment system?

Significance of the Study

The purpose of this study is to explore the colonial legacy embraced in Nepali ME, which has restrained us within a narrowly conceived curriculum image of cultural reproduction (Schubert, 1986), a one-size-fits-all transmissionist pedagogy (Freire, 1993), and disempowering standardized assessment (Lamichhane, 2024), to envisage an inclusive ME. I have realized that, through a prolonged enactment of the reproductive module of the curriculum, all other forms of knowledge, ways of knowing, and perspectives emanating from the GSTR countries were relegated. It signifies that to bring a paradigm shift and envision inclusive ME, we have to critique, challenge, and dismantle the colonial forces.

I have experienced that the mathematics curriculum has exclusively acknowledged the western hegemonic scientific paradigm, anchored its unidimensional and narrow division of knowledge among disciplines, which governs teachers to adapt a positivistic notion of pedagogy and assessment, and restrains the ME program as a training center for preparing the students to test (Luitel & Taylor, 2012; Paraskeva, 2016). Its bureaucratic centralized form does not recognize the

knowledge and skills that have emerged from the life world of people as worthy of inclusion in our curricular and pedagogical activities. In this connection, this study supports the unfolding of invisible oppressive forces beyond such a mimetic, decontextualized curriculum, which might help develop critical awareness among practitioners and encourage them to engage critically for the revitalization of ME in Nepal.

Similarly, the aligning pedagogical and assessment systems of the reproductive model of curriculum confine education to an external terrain and view learning as the accumulation of discrete mathematical tasks and skills through mechanical procedures. The dominance of procedural and mechanical pedagogy in mathematics, which focuses on preparing human resources that meet industrial demands, has been implicitly endorsed by the interests of colonial actors for their own benefit (Fuller et al., 2016). Such pedagogical practices create a deep trench between classroom mathematics and people's life worlds, ultimately supporting colonial power centers in neutralizing and naturalizing the metanarrative of Western superiority and obscure the detrimental effects of Western-Eurocentric beliefs and sociopolitical, economic, and educational policies that align with them (Baidoo-Anu & DeLuca, 2023). The hidden aims of an apolitical, asocial, and ahistorical approach to curriculum and its aligned pedagogical approach are to cover up the present global crisis—violence, economic disparities, social injustices, onto-epistemic injustices, global warming, and environmental degradation. Likewise, the ignorance of knowledge and ways of knowing and doing through the imposition of so-called modern mathematics does nothing but suppress the inherent capacity of GSTR countries and their people for progress and development (Luckett & Bhatt, 2024), thereby further supporting ongoing colonial subjugation. In this context, my inquiry envisions a pedagogical approach to develop critical awareness and spiritual consciousness to enrich mutual respect, collective well-being, social and onto-epistemic justice, and nourish planetary well-being for a sustainable future.

Moreover, another powerful metanarrative that the colonial power centers have implanted through the neoliberal political economic policy and its aligning educational system is privatization and commodification of education for personal benefit and profit, which develops the consumerist cultural and regards material possession as the ultimate goals of life to be so-called modern people that engulf the collective well-being, mutual respect, and nature-culture coexistence. In the race of

being so-called modern people, modern education in general and mathematics education in particular, un/knowingly teaches the pupils to rejoice only material possession and economic rationality without having critical looks on declining values and credibility of democracy, political and cultural fragmentation (Marginson, 2024) and pervasive genocidal effects of colonial hubris not only on the lives of the GSTR people but also on non-human creators and rest of the nature that threaten the substantiality of the mother Earth (Shiva, 2005). In this context, I have tried to address these issues by envisioning an inclusive mathematics curriculum, futuristic pedagogy, and transformative assessment. Likewise, the enduring effects of neoliberal perspectives on education have made it apathetic to the suffering from different forms of injustices, including epistemic injustice in GSTR countries, and people were and are compelled to remain ignorant of deeper values, ways of knowing and doing emanating from the lifeworld of people that sustain a meaningful life.

In this regard, I have sought to consider the above-mentioned issues that might mark a groundbreaking stage in inclusive ME, as this inquiry helps teachers, curriculum designers, and policymakers understand how to challenge, critique, and dismantle the oppressive invisible, offering new synergistic spaces for developing inclusive ME. Likewise, it encourages policy makers, curriculum designers, and practitioners as well to be aware of their own onto-epistemic practices, historical values, and nature-culture relation so that learners can take ownership and authorship of their learning and knowledge that prevents the mathematical Othering (Abtahi et al., 2020) and victim-blaming culture (Lamichhane, 2019; Luitel & Taylor, 2012), which seem to be significant problems of ME in Nepal and other countries as well. In addition, the study has significantly heightened my eagerness to continuously critique and disrupt the ME grounded in Western-Eurocentric colonial perspectives, and has led me to envision an inclusive curriculum, a futuristic pedagogy, and transformative assessment that may enable my readers to revisit their perspectives and practices. In this regard, the study has encouraged research participants, readers, and practitioners to be aware of the ongoing harms colonial legacies in ME and to engage in inclusive ME, potentially helping them become active agents and conscious citizens. It signifies that the study could explore the explicit/implicit oppressive forces and has opened a new avenue for fostering inclusive ME for the well-being of human society and nurturing nature-culture coexistence for a sustainable future.

Last but not least, the study opens new discourse in the context of Nepali ME by raising the question of how we can acknowledge the values, perspectives, and onto-epistemic practices of majority-minoritized groups. That is, this study supports recognizing multiculturalism and multi-epistemic ME, which are significant in Nepal.

Delimitation of My Inquiry

I have used a postcolonial auto/ethnographic research methodology to navigate my inquiry. It is based on my lived experiences and those of five research participants. Of my four participants, only one is female. It seems like a gender disparity. However, due to the nature of socio-cultural and political dimensions of my study, I need information research participants who can engage with these dimensions of ME. From this perspective, it is very difficult to locate such a research participant; as a result, there is only one female participant. Likewise, I want to explore colonial perpetuation in ME and its impacts on curriculum, pedagogy and assessment system. In such case, whether there are equal numbers of research participants in terms of their gender have no significant contribution in the discourse of colonial legacy in ME of Nepal.

I have employed narrative, dialectical, poetic, metaphorical, and non-textual genres to generate the field texts. Postcolonial auto/ethnography is an alternative approach that seeks to explore power dynamics in educational institutions, societies, nations, and the world, with the aim of uncovering the oppressive forces embedded in ME that subjugate GSTR countries and their people. Likewise, it focuses on envisioning an inclusive and empowering ME by acknowledging and valuing marginalized voices, perspectives, onto-epistemic practices, and scholarship. I have used formal and informal conversations, dialogues, and interviews with my five research participants, along with my reflections on a journey of more than four decades with ME, to generate the field texts. In this context, the meanings generated in this inquiry are highly contextual and time-bound, so their generality and transferability could be limited within a similar context. Likewise, the meanings of the field text and their interpretations are informed by a postcolonial perspective, Habermas's knowledge-constitutive interests, and critical pedagogy. Last, but not least, the major focus of this research is the exploring of external colonial forces and their impact on ME. I have not paid much attention to internal discrimination due to the hierarchical so-called caste system that might have adverse effects on the educational attainment of those groups. It should be the area of further investigation.

Organization of My Inquiry

This thesis is framed into ten chapters. The first chapter presented the emergence of my research issue, the formulation of the research problem, the construction of the research questions, the study's significance, and the delimitation of the study. Chapter II is devoted to conceptualizing the postcolonial rendition in ME, comparing anticolonial and decolonial discourse, and presenting my theoretical referents. Chapter III described the methodological approach employed in this inquiry. In this chapter, I have briefly explained my philosophical position, research paradigms, research method, selection of research participants, ways of generating field texts, the interpreting and meaning-making process, ways of addressing quality standards, and ethical issues. Likewise, I have spent chapters IV to VI exploring colonial vestiges in mathematics curriculum, pedagogy, and assessment. Chapter IV captured the colonial legacy in the mathematics curriculum through four major themes: encountering a dead map of the curriculum; an exclusive view of reality; the neutralization of epistemicide; and hegemonic colonial ideology. Chapter V explored the mechanical/instrumental pedagogy under the major themes—pedagogy as/for developing magic/naïve consciousness, pedagogy as/for magnifying social/epistemic injustice, and pedagogy as/for concealing glocal crisis. Chapter VI unearthed a disempowering assessment system captured under: assessment as/for instigating a victim-blaming culture; assessment as/for demolishing an engaged learning culture, assessment as/for enriching disciplinary egocentrism; assessment as/for reinforcing epistemic injustice. Moreover, chapters VII to IX are devoted to envisioning the mathematics curriculum, pedagogy, and assessment.

In chapter VII, I have portrayed an inclusive vision of the mathematical curriculum that should foster the zoe, eco, and techno vision, spiritual consciousness, and transformative praxis. In chapter VIII, I have depicted a futuristic pedagogy that incorporates the concepts of engaged learning, critical consciousness, and planetary well-being. In chapter IX, I have envisioned a transformative assessment system that illuminates assessment as embedded in learning cultures and should foster a holistic learning environment, epistemic agency, and healing praxis. Finally, in chapter X, I have presented my final reflection insight and way forward.

Chapter Summary

In this chapter, I have articulated how my research issue has emerged. My research issue emerged from my lived experience. I have realized that our education

from the very beginning of formal schooling has not been deeply rooted in the soil, culture, history, and lifeworlds of the Nepali people. There is a contradiction between our ground realities and the education system. Our country is an agrarian one; however, students were and still are discouraged from engaging in agricultural fields. Similarly, from the beginning of modern education, Nepali people were tagged as illiterate, even though they have their own history, knowledge systems, skills, and technologies. This knowledge, skills, and techniques have not been recognized as worth including in a formal school curriculum that supports detaching ME from its culture. In this context, I have formulated the purpose of my inquiry as exploring the colonial legacy embedded in the ME, thereby envisioning an inclusive and empowering ME in Nepal. In the course of the investigation, I have found that mathematics curriculum practice is informed by a 'winner-takes-all' metaphor. Likewise, the pedagogical approach seems to foster false consciousness, and assessment systems validate this disempowering curriculum, further marginalizing the majority of learners from other cultures. In this context, I have formulated my overarching research question: How has the colonial legacy embedded in ME in Nepal, and how do my research participants and I construct visions for inclusive ME in Nepal? This overarching research question is followed by three subsidiary research questions focused on curriculum, pedagogy, and assessment systems of ME. These three research questions have guided the inquiry process.

Finally, I have briefly presented the significance of my study. I have realized that this study appeals to mathematics teachers, curriculum developers, teacher educators, practitioner researchers, and other concerned authorities to critically examine whether contemporary ME is deeply embedded in the soil, culture, history, and lifeworlds of the Nepali people. In this context, this research initiates a new discourse in ME, paving the way for transformative mathematics. At the end, I have described the study's delimitation and highlighted the thesis's organizational structure.

CHAPTER II
CONCEPTUALIZING POSTCOLONIAL RENDITION AND SELECTING THEORETICAL REFERENTS

In this section, I outline how I have conceived of a postcolonial rendition of ME in the context of Nepal and explicitly describe the theoretical lens I have employed to interpret and meaning-making process. In this process, I came into contact with congeries of anti-colonial, decolonial, and postcolonial renditions, of which postcolonial is helpful for my study. Postcolonial rendition, along with its strategic essentialist aspects, is relevant to my research context. Now, I have articulated why I have admired the postcolonial renditions and strategic essentialism in my research, and which theories and perspectives work as theoretical referents for my inquiry.

Anti-colonial Rendition

Nepal is a historical country that has not undergone a geographical and physical conquest by a colonial power; however, it lost a substantial portion of its territory during the colonial era. The Sugauli Treaty-1816, between Nepal and the British East India Company, resulted in Nepal ceding a large part of its territory, including Darjeeling, Tista, Gahdawal, Kumau, Kalapani, and several parts of the Tarai region. Our ancestors demonstrated their bravery and prevented Nepal from becoming a colonial nation, but due to a lack of sustained courage and determination, and weak independent diplomatic relations with the British East India Company, we failed to reclaim the land seized by the British. On the one hand, it remains a matter of national pride in the South Asian subcontinent, where most territories were conquered by the British, but Nepal remained independent. On the other hand, it also became a national grief and a tragic moment etched in the hearts and minds of Nepali people because of the inability to reclaim our land. Throughout the political history of the South Asian subcontinent, various forms of colonial rule have emerged and disappeared since the fifteenth century. However, Nepal remained independent; yet, it was not immune to the multifaceted effects on the lives of its people and the nation. During the mid-20th century, the global anti-colonial movements had a profound impact on the South Asian subcontinent. It witnessed an intensified anti-colonial struggle and thus became a politically independent region.

The anti-colonial perspective emphasizes political independence, which has led to moments of liberation worldwide, resulting in most countries achieving political sovereignty and freeing themselves from direct governance, dominance, exploitation, and violence (Brissett, 2018; Gramsci, 1971; Said, 1978; Young, 2016). After the end of historical colonialism by1950, people in formerly colonized countries had started to use their sovereignty for selecting and forming the government; however; a new discourse has emerged in the fields of education, researches, and literatures questioning whether the people in both colonized and never-colonized countries have truly been independent so that they can revitalize their ways of knowing, doing and being or are there remaining the colonial domination. The academic research and literature of that period played a significant role in creating the anti-colonial movement, most of which seemed successful in negating direct forms of European colonialism, in which colonial powers conquered the land, exploited natural resources, and exploited labour. The anti-colonial movement focused on the material conditions of the state, drawing on Marxist thought that emphasized the economic aspect as a major indicator of independence and development, achievable through class struggle. The role of education was limited to a tool for political mobilization. Due to an overemphasis on economic determinants, the anti-colonial movement did not thoroughly examine the enduring impacts of long colonial rule on governance bodies and other state institutions, including social institutions, banking sectors, and educational institutions.

The colonial power center had already created native elites who ruled over the states and educational institutions, perpetuating the colonial legacy. Indicating this aspect, anti-colonial scholar Fanon (1967) labeled native elites as having black skin and white mind. People failed to recognize them who work as 'comprador intelligentsia' (Gramsci, 1971; Luitel, 2009). It is invisible and shapes the lives of the people and state and forms the educational policies. The comprador intelligentsia, backed by the colonial power center, created the metanarrative of the end of colonialism without end (Santos, 2016), which provided sufficient spaces for continuing colonial domination. Many scholars in the filed have had consensus that anticolonial moments only brought the political independence but rarely enabled the people of the GSTR to revitalize their substantive ways of living, collaborative and ecofriendly thinking and experiential ways of learning that unwantedly suffers through insidious legacies of colonialism which remain largely invisible compared to the direct

military domination and violence (Brissett, 2018; Gandhi, 2019; Nkrumah, 1965). It signifies the necessity of exposing enduring effects in different sectors of both colonized and never colonized countries and their people by unearthing the deep-seated legacy of colonialism—asymmetric of power, exploitation, economic inequalities, and onto-epistemic injustices which had been instigated by creating mythos of neutrality and systemic structure of societies, nations, and institutions (McLearn, 2016) that need to be delinked.

Decolonial Rendition

Decolonial rendition encompasses the concepts of delinking, a radical departure from Western-Eurocentric thought, epistemology, and values in educational policy, curriculum, pedagogy, and research. It does not limit its discourse to the political liberation moments that brought national freedom by expelling the colonial power center from the native territories. Decolonial scholars (Chilisa, 2012; Mignolo, 2011; Santos, 2016) have recognized that, following the end of historical colonialism, there is a high likelihood of influencing former colonized and never-colonized countries through education, technology, language, and financial support, among other means. The decolonial scholars further argued for epistemic disobedience and the revitalization of pluralistic thinking in the epistemological practices of the native people of the GSTR. They further argued for introducing contextual and place-based pedagogy and epistemological practices emanating from the learners' life worlds that help make learning meaningful and lifelike (Rudolph & Brown, 2017; Wagle, 2021).

From a decolonial perspective, teaching, learning, and research activities become meaningful and lifelike when grounded in the contexts in which learners grow up and have the opportunity to use their language as a medium for teaching and learning. This is because learners can only engage deeply in discourse if they are allowed to use their own language. In this context, Chomsky (2000) argued that it is necessary to provide ample opportunity to the learners to participate in discourse through their native language, which supports developing critical, creative, and imaginative thinking so that learners become conscious citizens; otherwise, the learning trajectories have been blurred, and learners seem to be disoriented travelers at a crossroads. It signifies that the use of a second language—particularly English as the medium of instruction has resulted in learning deficiencies because it misrecognizes the lived experience of learners from marginalized majority groups that stifles creative,

critical, and imaginative thinking, becoming a powerful ideological apparatus underpinning the epistemicide (Phyak, 2021; Paraskeva, 2016; Santos, 2016).

Moreover, the decolonial perspective calls for challenging and disrupting the post/positivist research paradigm. In an academic landscape, research which is informed by post/positivist paradigm becomes one of the most powerful tools for perpetuating the colonial legacy and its detrimental effects on educational institutions, societies, nations and the world (Taylor et al., 2012) because it establishes functional relational among the variables through the hypothetico deductive approach that not only support to suppress the alternative visions, ways of knowing and doing but also naturalize and neutralize inequalities, exploitation, violence, catastrophic climate change, economic disparities, and asymmetric power distribution (Apple, 2019; Pinar, 2004; Slattery, 2006; Smith, 2012). The hidden aims behind the proclamation of the post/positivist research paradigm are to inhibit the learner from becoming familiar with the present crises of the world, created by the mindless replication of colonial agendas, which maintain and safeguard an exploitative, repressive, and ruthless paradise (McLearn, 2016; Patrick, 2025). It signifies that a decolonial perspective is always oriented to disrupt the silencing and erasure strategies of the colonial power centers.

The strategy of silencing has been deployed to keep aside the native people and sometimes other people as well, regarding the different forms of violence of colonialism, and prevent them from speaking against the violence. Likewise, the erasure strategies adopted to create a homogeneous world in which colonial language (particularly English), Western cultural superiority, and their ways of living and doing are celebrated, aiming to establish a notion that there is no alternative (Rudolph & Brown, 2017). This kind of silencing and erasure also occurs in school, as well, because our school rarely allows the students to participate in free and pure discourse (Taylor & Williams, 1992) in the name of implementing a highly centralized and bureaucratic curriculum and its aligned transmissionist pedagogy that reproduces the image of curriculum as cultural reproduction (Schubert, 1986).

In this context, I have come to understand that a decolonial perspective focuses on delinking, disrupting, and negating the colonial matrices, offering non-Western and non-colonial perspectives on curriculum, pedagogy, and assessment that may lead to an alternative form of ethnocentrism. This perspective accepts that colonialism has ended, and we need to delink the education from its remnants. However, it has been

overlooked that the emerging form of colonialism, manifested through modernism and neoliberal capitalism, has shaped the lives of the people and structured the state mechanism accordingly, which is more harmful than visible historical colonialism because it is operated invisibly, thereby spreading over the colonized and never-colonized countries as well (Lamichhane & Luitel, 2023b; Quijano, 2000). It signifies that although Nepal has an identity of a never-colonized historical country in the landscape of the global political history, it has not remained isolated from the social, cultural, political, and educational influences emerging from of colonialism (Lamichhane & Luitel, 2023a; Luitel & Taylor, 2010; Poudel, 2021)—what van Stam (2017) refers to as the age of super colonialism. In this regard, I have considered a postcolonial perspective to explore the complexities and intricacies of mutational forms of colonialism and their detrimental effects on people, society, the nation, and the world.

Postcolonial Rendition

In this subsection, I articulate why I employed a postcolonial rendition in my study. By adding the prefix "post-", the word "postcolonial" generally refers to the period after colonialism. This discourse was found to be pervasive before 1970, as the colonial power center and the comprador elite government (Nkrumah, 1965), simultaneously created a metanarrative of ending colonialism to veil their continuous domination, exploitation, and violence (McLeod, 2007). If we understand and adopt this conception and meaning, then we almost inevitably divide the history of the nation into two parts—before and after a certain referring date of liberation, from which we ceased to be a colony and became an independent sovereign nation. It is not implacable in our country because our country has never been colonized, but we could not remain distant from the detrimental effects of colonialism. In my opinion, it is a way of writing a history of the nation and the history of the development of the particular discipline, considering only what happened before and after in a linear process that rarely unearths the true essence of social, cultural, historical, and political intricacies embedded in the history (Lamichhane & Luitel, 2023a). For example, I had been taught that the 5th to 14th centuries were the dark ages of mathematics, which did not seem to hold for the South Asian subcontinent, where some of the most powerful mathematical constructs were developed (Joseph, 2011; Raju, 2007).

Likewise, we questioned whether the narrative of the end of colonialism after 1950 or 1970 was true. Which is the marking date after which no colonial invasion has

been observed? We have witnessed that many countries have lost their sovereignty, while others have lost a specific part of it, and still others are struggling to retain their sovereignty. For example, you can see the history of Sikkam-1975, Western Sahara (see Kohen, 2015), Northern Cyprus (see Hoffmeister, 2006), East Timor (see Chinkin, 1993), Crimea (see Brunk & Hakimi, 2024), and many more. It indicates that there is no specific date for the end of colonialism. From this perspective, I have come to believe that colonialism has not ended on a particular date, but rather it has manifested in different forms and is in the process of dissolution as well.

Moreover, post-colonial, is used in the history of postcolonial studies. It has often been used to refer to the post-independence history of countries that were once politically part of the colonial empires. This statement is not entirely incorrect, which somehow reflects and simplifies the study of the history of formerly colonized countries and territories (Ashcroft et al., 2000), but not in the sense of ending colonialism globally.

After the late 1970s, the discourse of postcolonialism has been used by literary critics to discuss the various cultural effects of colonialism rather than to study its aftermath (Ashcroft et al., 2000). The discourse of postcolonialism has been enriched by the poststructuralism that widens its discourse beyond the political affairs, thereby including the discourse of other state machineries, including educational policy, curriculum, pedagogy, assessment, and epistemology that further support the perpetuation of the colonial hubris (Andreotti, 2011; Bhabha, 1994; Gandhi, 2019; Patrick, 2025; Spivak,1988). The central argument posits that postcolonialism is not merely a historical period following direct colonial rule but an active ongoing political, educational, and theoretical intervention against a persistent global system of colonialist/imperialist economic and cultural domination (Andreotti, 2011). In this context, I have conceived postcolonial rendition as a comprehensive sum of various social, political, economic, cultural, historical, and educational changes that began after the initial impact of colonialism was felt.

The first step in establishing the colony was essentially a violent process, as it involved forcibly conquering and occupying territories and extracting the natural resources that initially belonged to the native people. It suggests that postcolonial rendition is concerned with the colonial history that has shaped the configuration and power structures of the present, to the extent that much of the world still lives in the violent aftermath of its wake (Young, 2016). The colonial power centers engaged in

physical, as well as epistemic, cultural, economic, and social violence to maintain their superiority across every sector of the GSTR nations and the lives of the people. In doing so, it appears to align with the modernist perspective that promotes instrumental rationality and scientific logic, which have overtaken other forms of thinking and reasoning (Collins, 2007).

Modernism and colonialism are two sides of a coin and appear to have advanced hand in hand (Ball & Collet-Sabé, 2025; Quijano, 2007). Through the misuse of modern science and technological advancement, the colonial power centers deployed ultramodern weapons and military forces to physically conquer land and establish colonial structures on the periphery, thereby instigating Western-Eurocentric ideology through education, which further strengthened the colonial presence in GSTR. It signifies that colonialism is not only a political and economic project but also an educational, social, and cultural project that underpins the epistemological foundation of modernity—a form of epistemicide (Paraskeva, 2016; Santos, 2016). The Western modern paradigm has produced a singular history, culture, and universal language (e.g., English) and has been used to denigrate other cultures, histories, and epistemologies, positioning them as primitive and stagnant, thereby blaming their people as uncivilized, barbaric, and unproductive. Behind the veil of modernity, colonizers create a myth of civilizing the colonized to achieve economic progress (Andreotti, 2011; Gramsci,1971; McLeod, 2007; Said, 1978). The myth of the civilizing mission further intensifies the colonial presence. It supports the extraction of raw materials and other resources for industrial production, and the secure markets, further provide a solid foundation for the expansion and survival of capitalist economic policies. It makes clear that colonialism is not a simple historical episode but a mindful project deeply embedded within the historical, social, cultural, and political structures of European modernity, which constitute the firm foundation of the capitalist economy.

Capitalism further provides the powerful apparatus and systemic structure for colonial endurance by introducing the notion of the globalization and defining development and its benchmarks. The globalization, under the guise of a global village oriented toward the accumulation of wealth, often attained through the manipulation and exploitation of labour, and mistook technological advancement (McLearn, 2016). The capitalist model of economic growth, which focuses solely on material advancement, becomes the unquestionable measure of development, placing other

traditions, cultures, knowledge, and substantive economic models as inferior and primitive—a new form of colonialism, as Nkrumah (1965) calls it, neocolonialism.

Likewise, capitalism becomes the primary source of economic exploitation because it functions on the periphery, often subjugating local non-capitalist societies and dismantling their products in favor of the metropolis. McLearn (2016) critiques capitalism not only as a mode of production that perpetuates class warfare, but also as a world-devourer with insatiable greed that engulfs everything in its path. In a similar vein, Leech (2012) has convincingly argued that capitalist-induced violence is structural in nature and indeed constitutes genocide. Here, violence can be viewed as the foundational Cartesian logic, rational thinking, singular reality, and objective epistemology of capitalist or Western thought, presenting itself as universal truth upon which all our thinking, knowing, doing, and being in the world rely. Such violence is perpetuated through the state apparatus, including education, and in particular through banking pedagogy, in which creativity, criticality, and dialogue are precluded and thus privileged the Western capitalist mode of thinking, thereby omitting and systematically erasing other worldviews, which can be conceived as genocides as well. The capitalist mode of thinking and production instigates the economic rationality in which students are treated as commodities to be sold in the market in the name of employability. Producing employable human resources is a significant goal of education, in which the primary aim of individual students is to accumulate wealth for personal benefit at the expense of social welfare; this ultimately gives rise to neoliberalism.

Neoliberalism is not simply an economic theory. It is a sum total of educational, social, cultural, ideological, and economic projects that aim to reshape the political, educational, and economic status of the GSTR countries, implicitly seeking to continue colonial supremacy through market-based economic policies (Mayo, 2015) and modern education. A neoliberal educational policy instigates the notion of marketization, competition, privatization, individualization, and standardization worldwide by creating the false metanarrative of the materialistic advancement of the individual learner, society, and nation. The neoliberal hubris has shifted the conception of education as a public good into a corporate enterprise that aims to make a profit, serving the insatiable greed of corporate masters who commodify education and learners as products of business.

In this process, neoliberalism thingifies and commodifies education as a market commodity to be purchased and sold. It engendered a structural compulsion in which individuals with economic means can access education, while the minoritized majority is systemically excluded from educational opportunities. Likewise, neoliberal policy encourages individuals to open new schools, making the education market more competitive and shifting the state's responsibility for educating its citizens. Economically wealthy or elite groups invest in private schools, as they are considered the most secure and profitable sectors, becoming a significant factor in reproducing the 'status quo' in society (Bourdieu & Passeron, 1990). The core of neoliberal ideology has been constituted by free-market, competition, privatization, and individualism that overturn the state responsibility for providing social welfare and all other public spheres, like education, health care, food security, and sovereignty, right to shelter, etc., and make them the fields of investment to get maximum return. Such structural adjustment in aid-dependent countries of the GSTR was prompted by supranational financial organizations such as the IMF, WB, and ADB (Mayo, 2015; Regmi, 2017, 2023).

Moreover, Ball and Collet-Sabe (2025) argued that neoliberalism is a mutational hybrid form of capitalism and colonialism that intensifies the ideology of neocolonialism, a seemingly hidden but more brutal iteration of the past colonial project. It is because neoliberalism produces neoliberal educational subjects through mundane practices under the guise of competition, standardization, uniformity, and consistency, and a universalist assumption that renders exploitation, domination, and subordination, thereby reinforcing epistemic supremacy. It signifies that neoliberalism reconfigured colonial domination into new market-based modalities—privatization, standardization, trade liberalization, and the marketization of everything—that not only favor the metropolitan and corporate interests of maximizing profit but also induce catastrophic and endemic problems on the planet.

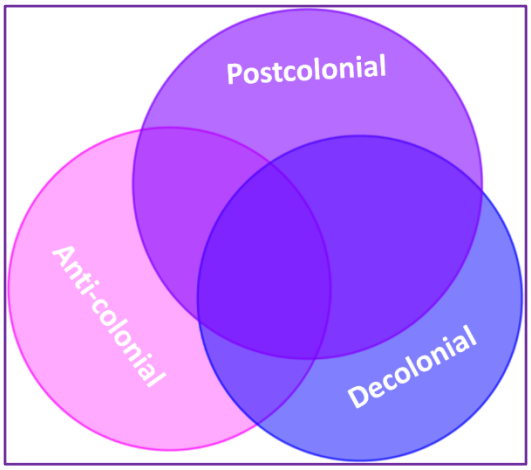
Many postcolonial and postmodern thinkers (Brown, 2015; Gandhi, 2019; McLearn, 2016; Pinar, 2004; Slattery, 2006), environmental activists and scholars (Ceballos et al., 2015; Khaksar, 2020; Shiva, 2005), posthumanist thinker (Braidotti, 2019) have raised the issues of climate change, global warming, environmental degradation, losses of biocultural diversity and human invasion to nature. They further argue that the projects of colonialism and modernism have jointly underpinned human beings for the exploitation of natural resources and the lives of non-human creatures in

the name of industrial development, economic growth, and short-term materialistic benefit, only for human beings, insidiously disrupting the ecosystem of the planet earth, thereby welcoming a catastrophic future. At this stage, we do not ignore the role of modern STEM disciplines in materialistic development that facilitates the people's livelihoods; however, it seems irresponsible to lose biocultural diversity, given the impacts of climate change, and global warming (Luitel, 2022; Taylor & Taylor, 2019). Likewise, Khaksar (2020) and Kolbert (2014) explain that the present neoliberal state mechanism, which focuses on the marketization of everything for the benefit of humans (primarily Western humans), particularly the ruling class, is contributing to the sixth extinction.

Here, the sixth extinction refers to habitat destruction (deforestation, urbanization), air, water, and soil pollution (industrialization, fossil fuel burning, irresponsible human activities), climate change, overexploitation (hunting, fishing, poaching), loss of biocultural diversity (destruction of biodiversity, elimination of ethic languages, cultural invasions) and invasive species (introduced by human activities) that causes dying out species during the present geological era as the result of the human activities rather than natural disaster (Braidotti, 2019; Kolbert, 2014).

Figure 6

Continuum of Postcolonial Rendition



In this context, Carl Sagan (as cited in Ball & Collet-Sabé, 2025) argued that "extinction is the rule. Survival is the exception. And schools are one site in which ethics of extinction are reproduced" (p. 6). It signifies that postcolonial rendition also needs to consider the issue of interconnectedness, interdependence, and coexistence between human beings and the rest of nature for a sustainable future of the world, in which all lives are possible. Here, readers have a significant question: how do you incorporate such a complex construct of postcolonial rendition (see Figure 6) into this study? It is not so difficult for me to include such a construct because I have employed the strategic essentialist approach (Spivak, 1988).

Strategic Essentialism

Essentialism is the set of beliefs in which there are certain basic elements, categories, definitions, and common features that are necessarily essential for the well-functioning of society, educational institutions, and the nation as well (Ashcroft et al., 2000). Essentialist studies of history, culture, and the educational process have promoted binaries of superiority and inferiority, such as colonizers as superior and colonized people as inferior, teachers being superior and students inferior etc., thereby perpetuating colonial hegemony and maintaining social and institutional orders. Specific attributes should have been essentially maintained and protected in their essence; however, this is not a universal rule. In this context, strategic essentialism argues that we must critique essentialism, but at the same time, we should use it in a considerable manner that is inescapable (Spivak, 1988). It is a strategic, temporary, and political practice necessarily employed to achieve a specific temporary goal. I believe that mathematics has some essentialist features; however, uncritically importing these features may prevent learners from making an informed choice of epistemology. Strategic essentialism helps me be aware of hegemonic domination and, at the same time, provides space to use the basic essential features of mathematics creatively and mindfully by considering its social, political, and ethical aspects.

Strategic essentialism is not a theory but situational and context-specific strategic actions. For example, I have taken a seemingly anti-colonial stance when exploring the colonial remnant and its detrimental effects on ME, while envisioning inclusive ME, I have employed postcolonial perspectives, along with Vedic and Jain traditions. All of these perspectives give context-specific meanings and implications rather than universal intonations and inferences.

Moreover, as a Nepali mathematics educator and practitioner researcher, I have devoted most of my time to developing the chapters in my inquiry to explore the multipronged vicious effects of colonial remnant, which not only hinder our education system but also have irreparable damage in our social, cultural, and historical values, as well as our ways of knowing and doing (Lamichhane & Luitel, 2023b). In this context, I could not give much attention to exploring and dismantling our internal disempowering forces—ethnic/caste, lingual, and class discrimination, even though these factors have subversive impacts on the lives of the Nepali people. I have adapted this approach from the strategic essentialism because colonial remnants, with their

scattered webs and devastating and irreversible influences, have deeply subordinated Nepali life and the education system.

My Theoretical Referents

To my understanding, theoretical clarity is crucial for generating, interpreting, and making meaning of textual data; however, a narrowly conceived theoretical and/or conceptual framework can restrict the emerging nature of inquiry. The major orientation of my research is to envision transformative mathematics education in Nepal. In so doing, I have initially decided to use transformative learning theory, proposed by Mezirow (2012). Later on, I have realized that Mezirow's transformative learning theory basically describes the psychological transformation of the learner within the educational terrains that has not fully captured the essence of my research issues, which focus on structural transformation in which the power dynamics of the society, nation, and the world at large play a significant role to frame the ME of Nepal. I have realized that other transformative theories have helped me describe existing ME and envision inclusive ME. In this regard, I have used the postcolonial perspective (Andreotti, 2011; Said, 1978; Young, 2016), Habermasian knowledge constitutive interest (Habermas, 1972), and critical pedagogy (Freire, 1993) as my theoretical referents.

Postcolonial Perspective

The postcolonial discourse in education has gained prominence since the publication of Edward Said's Orientalism in 1978, and is informed mainly by anti-colonial or decolonial movements worldwide that sought liberation, primarily from European colonization (Gandhi, 2019). The anti-colonial movements focus on liberating colonized nations from political and military subjugation, thereby revitalizing their sovereignty and democratic practices. After the massive movements around the world for freedom, democracy, and human rights, the colonizers took up their military forces and handed over the political power to the colonized nations. However, the inherent governmental structure, educational system, organizations, and practices, as well as cultural imperialism, have not been adjusted to the aspirations of socio-cultural, historical, and political contexts (Young, 2016). The former colonizers have a presence in colonized and non-colonized nations (such as Nepal) in the name of providing support for infrastructure development, technology, finance, educational policies, curriculum development, pedagogy, and assessment systems. These are achieved by utilizing schools and universities as vehicles for ideological assimilation

and homogenization, thereby legitimizing their values, perspectives, and knowledge as universal, neutral, and natural (Kanu, 2003). These attributes or practices are the major concerns of the postcolonial theory.

I have already stated in the previous section that the postcolonial perspective in academia does not simply refer to what comes before and after colonialism, but rather to what is retrievable from within its enabling hegemonic and essentialist strengths, continuing to shape human thought, organization, and existence (Spivak, as cited in Tarc, 2018). I have experienced that the essentialist thought, highly pervasive in ME, shapes our curriculum, text, pedagogy, and assessment, in which most of the activities are already specified by an uncritically imported, unchangeable frame of reference, and Western modern practices inhibit the epistemic multiplicity in ME (Luitel & Taylor, 2010). As a student, I was not offered the opportunity to participate in mathematical discourse, in which I could engage in solving real-world problems by deploying an alternative perspective. Similarly, I have not provided enough space for my students to engage in solving real-world problems because numerous arbitrary structures of ME have already constrained me.

I have observed that the postcolonial perspective is a form of critique that assembles the history and legacy of colonialism, making them visible in the socio-cultural, economic, and political lifeworlds of disenfranchised countries and people. The primary roots or traditions of postcolonial renditions can be summarized as Marxist historical, discursive (poststructural), cultural, and psychological (Andreotti, 2011), which propose ways to liberate individuals from colonial subjugation not only in educational sectors but also in the broader sphere of human society.

The postcolonial perspective provides a lens through which I have observed, analyzed, and critiqued the social, cultural, and political issues (Murphy, 2007) embedded in ME within its historical contexts, which in turn have shaped the field of ME. I have been concerned with the historical, socio-cultural, and political traditions of ME mainly for three reasons. Firstly, I have explored the colonial legacy (power/politics) that determined the formation and power structures of society, nation, and educational institutions, and how it controls, manages, and subjugates ME. Secondly, I have analyzed and critiqued the extent to which the mathematical activities (curriculum, pedagogy, and assessment) have been affected by the violent colonial legacy (Young, 2016). Finally, I have examined to what extent our socio-cultural and

historical knowledge (local knowledge), practices, and lingual issues are acknowledged or ignored in contemporary ME.

Moreover, postcolonialism encouraged me to critically examine all forms of oppressive forces, imperialist systems, and dominant power structures (within and outside ME) embedded in ME, with the ultimate goal of actively transforming present ME from its historical roots (Young, 2016). It signifies that the historic orientation of the postcolonial perspective describes the present text by referencing its historical continuity, prompting me to explore present mathematical practices within their historical contexts.

From the historic perspective of postcolonialism, exploring the genesis of the subject is not simply a description of the historical records, events, and embedded knowledge, but to analyze and critique for the grand purpose of preparing the ground for transforming the existing practices (Murphy, 2007) towards more inclusive and socially just practices. In this regard, the historical tradition of postcolonialism is helpful to my research, as it enables the excavation of broader political and historical perspectives to understand the inherent arbitrary power structure within ME and the implicit forces behind it. In this context, I realize that the historic tradition of postcolonialism supports me in addressing the first parts of my research questions. However, it has not been beneficial in envisioning alternative practices of ME because the historic tradition discusses and favors any one of the two antithetical terms, western and non-western, local and global, etc., which are supposed to be resolved by negating one of them (Young, 2016). It urges me not to be more liberal toward Western values, norms, and perspectives (Morton, 2007). In this context, to address the second part of my research questions, I have considered the discursive tradition of postcolonialism in which both Western and non-Western, local, and global values, perspectives, knowledge, and practices are equally recognized (Bhabha, 1994), but I must always be conscious of the disempowering and oppressive forces for creating an inclusive ME.

The discursive orientation of postcolonialism seems to lean toward poststructuralism. The poststructuralist orientation focuses on exploring a contestation, complexity, and ambiguous relationship between colonizers and colonized (oppressors and oppressed) and envisioning the new relationship beyond coercion, subjugation, and epistemic violence (Spivak, 1988) based on mutual respect that opens a new avenue for creating possibly empowering, inclusive, and authentic ME. The primary

concern of the poststructuralist position is a constant and immanent problematization of knowledge production that defies a unidimensional conceptualization of history, teleology, and emancipation, and acknowledges the roles of social, cultural, and linguistic presence in knowledge production (Haun, 2004).

From a postcolonial perspective, language is not simply a means of communication, but also represents and mediates social reality by creating a discourse replete with cultural assumptions and generates meaning within specific cultural contexts (Haun, 2004). Language is a product of emerging discourses shaped by a constant state of contestation and flux and by a differential system of social and cultural milieus (Bhabha, 1994), conveying the meanings, values, and perspectives of the cultures in which it evolved. A significant problem critiqued by postcolonial critics is that conventional educational practices often treat a medium of education (typically a foreign language) merely as a means of communication, without considering its relation to specific social, cultural, or ideological perspectives.

In my experience, the medium of instruction (education) is not a neutral endeavor; it represents the cultural or ideological perspectives that support the indoctrination into a dominant ideology, which informs curriculum, subjects, texts, and units. The dominant notion of pedagogy has gradually been planted, perpetuated, and allowed to account for historical injustice or oppression in different sectors of society and nation as neutral and normal (Haun, 2004; Morton, 2007; van Stam, 2017). This discourse signifies that postcolonial rendition is an approach to challenge the linguistic, cultural, and philosophical legacies of colonialism in the process of imagining inclusive ME in Nepal.

The cultural legacy of colonialism is not isolated from the linguistic, historical, and philosophical legacies. In my research context, culture refers to the set of activities that comprise our daily and academic lives. Culture is not something given; people construct it. It begins with people as creators of themselves and transformers of their environment, which enables them to shape their lives (Spivak, 1988). The dynamic emerging view of culture helps me raise questions about the externally imposed rules and norms in academia. It also encourages me to create an inclusive curricular and pedagogical environment that contributes to ideological and social transformation (Young, 2016).

The postcolonial rendition in academia not only focuses on the creation of equal access to material, natural, and technological resources but also on the

recognition of the socio-cultural, lingual, and ethnic voices and knowledge that prevent the contestation forms of domination and assertions of collective and collaborative forms of political and cultural identity (Morton, 2007). It suggests that postcolonial discourse proposes a unique approach to creating a view of coexistence by fostering mutual respect, governed by the principles of uninjured life and a non-injurious community (Gandhi, 2019). Similarly, postcolonial pedagogy aims to change deeply rooted imperialist mindsets and forge pathways to emancipate learners from all forms of coercion and oppression, thereby empowering them to contribute to transforming the ME into a more inclusive and holistic one.

Habermasian Knowledge Constitutive Interests

In this study, I have examined the extent to which repressive forces, in the form of natural or neutral exercise of power, are permanently present in the structure of ME and the extent to which domination is institutionalized. After exploring the uneven forces and power dynamics, I envision an inclusive ME. I have observed that most curricular, pedagogical, and evaluative activities have been prescribed and controlled by authorities. The institutional framework adopts an overly abstract structure that has not provided learners with sufficient space or opportunity to flourish and enhance their creative, imaginative, and critical thinking and problem-solving skills. In this context, I have remembered a pioneer critical philosopher, Jürgen Habermas, who wrote a book *Knowledge and Human Interests* in which he described three types of interests: technical, practical, and emancipatory, based on which social or educational institutions constitute the knowledge and operate accordingly.

The technical and practical interests are concerned with controlling and understanding phenomena arising from inclinations and greed, rather than from fundamental reasons (Habermas, 1972). The emancipatory interest is concerned with empowerment, which is informed by the principal reasons. It is the reason beyond the agreements of individuals and elite groups that challenges the Darwinian 'survival of the fittest' worldview, suggesting that the earth was given to some powerful elite groups of people or nations to subdue and rule over the rest of the countries and their people (Grundy, 1987). The emancipatory interest focuses on emancipating individuals and institutions from the coercion of technical and potential deceptions of practical interests, so that they can take control of their lives in autonomous and responsible ways (Habermas, 1973), a major concern of my study. In this regard, I

have decided to use the emancipatory knowledge constitutive interest as one of my theoretical referents.

In my experience, our ME needs to emancipate from the fundamentalist and essentialist approaches of WMW to empower practitioners, enabling them to design policies, formulate curricula, and choose appropriate pedagogies in autonomous and responsible ways. The autonomous and responsible learning culture provides an opportunity to engage in critical self-reflection and to take actions aimed at changing the structures that constrain freedom in often-unrecognized ways (Held, 2004). Similarly, engaging in critical self-reflective practices fosters authentic critical insights into the social construction of human society, and educational institutions support learners in being free from the 'false consciousness' (Habermas, 1972) that helps them understand the illusions created by technically exploitable knowledge. Moreover, the essence of emancipation has not been restricted to libertinism. It is the state of autonomy in which the nation, society, institution, and individual enjoy freedom and make informed decisions (Grundy, 1987). The informed decision-making process is not isolated and independent of the pedagogical culture of society and has been facilitated by non-distorted communicative actions, termed the 'ideal speech situation' (Habermas, 1972).

An ideal speech situation seems significant in the postcolonial rendition of ME. There are three major characteristics of the ideal speech situation, that are somewhat analogous to postcolonial descriptions of ME, as explained in the previous section. These attributes are free from domination and coercion, allowing for the development of unimpaired self-representation and an equal right to command others (Habermas, 1972). That is, the ideal speech situation is an environment within an educational institution in which practitioners have a full opportunity to raise questions about the reality of others' arguments. It enables practitioners to engage deeply in the discourse without any coercion and encourages them to express their arguments freely, taking sole responsibility for their actions (Taylor & Williams, 1992). The emancipatory interest, along with the ideal speech situation, suggests raising questions about the foundationalist and essentialist natures of ME, informed by the colonial legacy. It also encourages me to envision an inclusive ME that focuses on enriching mutual respect and recognition, developing unimpaired self-representations, and creating an empowering learning environment that fosters autonomous and responsible actions,

enabling practitioners to become aware of the hidden forces that have influenced ME and their own lives.

Critical Pedagogy

As a student, teacher, and practitioner-researcher, I have observed that ME practices in Nepal primarily focus on official knowledge endorsed by authorities. Many mathematics educators and researchers (Ernest, 2008; Gutstein, 2006; Luitel, 2009) have argued that existing ME practices have largely neglected or failed to foster creative, imaginative, and critical thinking due to the adoption of banking education concepts. The conventional ME urges learners to perform within the narrowly defined official text, fixing the meaning, and compels them to accept uncritical, objective knowledge (Freire, 1993). My primary concern in this research is to explore the in/visible forces behind the formulation and implementation of the banking model of education and 'one-size-fits-all' pedagogical approach for possibly envisioning a holistic pedagogy for developing critical, imaginative, and creative thinking by breaking the narrowly conceived view of ME as an acultural, ahistorical, and apolitical discipline. To my understanding, a key goal of critical pedagogy is to challenge the acultural, ahistorical, and apolitical views of ME that are shaped by power centers, in which dominant modes of exclusion are continuously naturalized through the control and manipulation of information by power wielders (Kincheloe, 2008).

In critical pedagogy, it is not sufficient for teachers to understand the multidimensional and sophisticated nature of subject matter, but they must also be able to view such content from the vantage points of culturally, historically, and politically diverse perspectives that help them to understand how socio-cultural, historical, and political are interwoven in ME (Monchinski, 2008). Teachers always need to encourage students to engage with the world around them, in the process of learning, to uncover the forces that have shaped them, and to be concerned with questions of justice, democracy, and empowerment. The democratic practices that foster the grounds of social justice and empowerment within mathematics classrooms have not been achieved if the mathematics teaching and learning activities remain isolated from real-world situations; that is what is happening in the world and its consequences for individuals, social groups, nations, and the world as well (Kincheloe, 2008). It indicates that mathematics teaching and learning activities are not limited to depositing mathematical content, concepts, and theorems, nor to compelling students to memorize, repeat, and reproduce these facts, which lack creativity, criticality, and

imagination, as this inhibits the transformation process (Freire, 1993). In this regard, Gutstein (2006) highlights that the primary goals of ME are to explore the existing oppressive forces of the world, how it operates, what the governing forces are, and whose interests are better served to engage in possibly transforming the world towards more just, democratic, and inclusive ones for the betterment of all human beings. Similarly, critical pedagogy is grounded in social and educational justice, committed to resisting cultural hegemony and exploring the unacknowledged intervention of power to unmask and understand the profound impact of the neocolonial legacy, which helps shape the essentialist and foundationalist structure of education and knowledge (Kincheloe, 2008).

Critical pedagogy rejects mechanistic, static, and naturalistic views of ME that regard students as passive recipients and lead them to conform to the world. It always focuses on the re/invention of knowledge through deep engagement in a historical and political realm, where the true meaning and essence of phenomena reside. That is, critical pedagogy is not limited to exploring reality in an objective form as it limits human agency and the possibility of transformative intent (Giroux, 2011). To foster transformative intent, develop human agency, and cultivate deep democratic practices within and outside the school premises, critical pedagogy recommends employing the problem-posing strategy (Freire, 1993).

The problem-posing strategy is not a panacea; however, it provides an opportunity to engage in constraint-free discourse, in which both teachers and students raise questions about their own assumptions, beliefs, and values, and respect others' perspectives. Such practices in ME affirm learners as they become, acknowledging them as unfinished and incomplete beings, and encourage them to imagine a better future for human beings and the world. In so doing, these practices consistently encourage learners to engage in inquiry and creative transformation through critical reflection and action on reality, allowing them to take sole responsibility and authority over their learning and view it as an ongoing activity (Freire, 1993). Moreover, the problem-posing strategy fosters humanistic and liberating praxis as fundamental practices for liberating learners from subjugation and domination, enabling them to overcome their false perception of objective reality, which is ahistorical, apolitical, and neutral (Freire, 2005). It also helps in enhancing critical consciousness among learners, which supports the emancipatory intentions of human beings, one of my

research objectives, which is why I have decided to use critical pedagogy as one of my theoretical frameworks.

The three theoretical lenses—postcolonial perspective, emancipatory knowledge constitutive interest, and critical pedagogy—help me generate perspectival meaning from the field texts. The perspectival meaning is not readily available from field texts; rather, it is constructed in the researchers' minds through the interaction and interpretation, in which historical and contemporary contexts play a significant role. Therefore, to generate perspectival meaning from the field texts, I have employed the metaphors of zooming out and zooming in (focus) approaches (Chang, 2016).

The postcolonial perspective supports me in zooming out to a big picture of ME, which enables me to see how the socio-historical and political context of the ME of the past has left traces in the present, how other perspectives dominate our own practices, and how our practices are connected to our context and others' practices as well. That is, the zooming-out approach enables me to hold a bird's-eye view to explore, explain, and interpret ME in relation to the political, historical, ideological, and socio-cultural contexts in which it takes place, thereby providing an overarching context for understanding its meaning (Chang, 2016). Whereas emancipatory knowledge, constitutive interest, and critical pedagogy focus on curriculum, pedagogy, and assessment practices. The zooming-in (focuses) approach enables me to turn my attention to detail probe into curriculum, pedagogy, and assessment one at a time, along with their interconnectivity concerning the big picture and the broader context (Bochner & Ellis, 2016; Chang, 2016). That is, the zooming-in approach enables me to gain a deeper understanding of the curriculum, pedagogy, and assessment practices within our social, cultural, and historical traditions. Particularly, emancipatory knowledge constitutive interest focuses on curriculum, making it more empowering and inclusive, whereas critical pedagogy focuses on developing a holistic pedagogy and a transformative assessment system that can assess the learners' multiple intelligences and skills.

Chapter Summary

In this chapter, I have conceptualized the postcolonial rendition in ME within the context of Nepal and portrayed my theoretical referents. I have conceived a postcolonial rendition as a way of engaging in discourse by considering the enduring effects of colonialism from the very beginning, not just after the end of political colonialism. This discourse claims that colonialism has not yet ended but has evolved

into various mutated forms such as modernism, capitalism, and neoliberalism, which have detrimental effects in the educational, cultural, social, political, technological, linguistic, and onto-epistemic sectors (van Stam, 2017). Likewise, I have described how I employed postcolonial perspectives, knowledge constitutive interests, and critical pedagogy as theoretical referents. The postcolonial perspectives help me zoom out the broader spectrum of ME and support exploring the detrimental effects of colonialism not only in human communities but also in the natural world. Similarly, knowledge constitutive interest and critical pedagogy provide the lenses for exploring the nature of disempowering and exclusive curriculum, pedagogy, and assessment systems, and underpin the envisioning of a multi/interdisciplinary and inclusive curriculum, empowering pedagogy, and a transformative assessment system aiming to create peaceful, socially just, and sustainable futures.

CHAPTER III
DEVISING MY RESEARCH JOURNEY

In this chapter, I have devised my research journey. It includes philosophical considerations that reveal my worldviews regarding the reality of the phenomenon under study, ways of knowing, and embedded values in my research. I articulate the paradigmatic underpinning of my study, which further guides my choice of research design. I have elaborated how my chosen methodology connects with my research issues and theoretical referents. In doing so, I have discussed how I explored the required field text (textual data) and captured its essence through textual interpretation. Finally, I have outlined methods for enhancing the quality standards of my research, along with the ethical considerations for upholding academic, personal, and social norms and values.

Philosophical Underpinning of My Research

Research is not an isolated task in which a researcher acts as an outsider observer and explainer. Research activities that are far removed from researchers' worldviews, values, convictions, and ways of knowing are likely to misrepresent the phenomenon under study (Held, 2019; Stetsenko, 2017; Willis, 2007). The selection of the research issue, the formulation of the research questions, the devising of the research methodology, the selection of theoretical referents, and the interpretation and meaning-making process are not independent of the researcher's positioning (Naomi, 2021). In this regard, I have come to realize that it is beneficial to explicitly articulate my philosophical stance for enhancing the transparency of the research. It comprises axiological, ontological, and epistemological premises. As a researcher, my stance on these attributes informs my selection of research paradigms and research design, which, in turn, influences the choice of research participants, the methods for generating the necessary textual data, and the meaning-making process (Willis, 2007).

Axiology: Revealing Power Dynamic[1]

My guiding research question—exploring the colonial legacy perpetuated in ME and envisioning a transformative ME oriented to unearthing value systems in educational institutions that are constructed by power dynamics of society, nation, and the world at large (Smith, 2012) has a significant impact on curriculum, pedagogy, and assessment (Kirylo, 2013). From this vantage point, I have first articulated my axiological stance. It describes a set of values, ethics, and perspectives that underpins social science research associated with the relationship among the researcher, research participants, subjects being researched, and broader social and political settings (Cunneen et al., 2016; Gullion & Tilton, 2020; Held, 2019) and the value systems that are established through this research. In this regard, postcolonial axiological positioning disrupts the hegemonic cultural values and perspectives that ignore non-Western perspectives and values, thereby dehumanizing and objectifying the people from the GSTR (Gramsci, 1971).

The untold intentions of the Western-Eurocentric values, which are reflected in educational policy, curriculum, and pedagogy via educational research, are to colonize and imperialize the educational institutions so that powerful (economically, technologically, and militarily) countries can produce the workforces necessary for industrial sectors and corporate business houses (Andreotti, 2011; Tarc, 2018; Young, 2016). The rejection of interdependence among the researcher, the subjects being researched, and the social and political contexts helps create a falsified narrative of neutrality, unbiasedness, and validity. Aligning with this view, Naomi (2021) has argued that it is necessary to challenge contemporary research scholarship informed by Western-Eurocentric perspective that seems to fail to unveil the hidden agendas of colonialism. Likewise, many researchers (Cunneen et al., 2016; Lamichhane & Luitel, 2023b; Smith, 2012) have stated that research becomes meaningless if it does not help develop critical consciousness among the researcher, research participants, readers, and the research community. It signifies that research should enable them to become critically aware so that they can make wise decisions in their lives.

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From the above discourse, I realized that research is not a solitary activity that remains far from social, cultural, and historical values. Implementing technocratically and bureaucratically informed research methodology with a so-called unbiased, value-neutral stance lays the ground for the indoctrination of colonial agendas (Chilisa et al., 2017). It helps wipe out indigenous or local values, perspectives, and ways of knowing and being in the world, and thus, learners fail to connect their knowledge to real-world scenarios. Describing the lack of integrity and responsibility in Western modern social research methodology, Smith (2012) argued that "researchers enter communities armed with goodwill in front packets and patents in their back packets" (p. 25). Similarly, Tobach (1972, as cited in Stroud & Baines, 2019) noted that Western modern methodologies have employed four horsemen of racism/ethnicism, sexism, militarism, and social Darwinism as tools for ideological homogenization.

In this connection, I have upheld a set of values throughout this research journey that encourage me to resist Western-Eurocentric hubris and to be aware of potential hegemonic and control-propelling situations (Luitel & Taylor, 2010). Likewise, I have embraced the notions of inclusiveness, social justice, mutual respect, and empathy that contribute to holistic well-being, as expressed in the conception of *Vashudhaive Kutumbakam*—meaning that the world is one family (Swami Vivekananda, 1996). In addition to these values, I have also embraced spiritual ecological values that acknowledge and respect all life on planet Earth and the rest of nature (Acharya, 2002; Shiva, 2005). It is quite different from the Western-Eurocentric view, which does not regard nature and non-human life on earth as objects to be conquered to fulfill human beings' excessive materialistic desires (Joseph, 2018). Moreover, the spiritual ecological perspective upholds the empathetic standpoints that equally respect human beings and the entire animate and inanimate world. They are interdependent and coexist in which human beings are contingent on nature and vice versa (Misiaszek, 2020). I have tried to establish these values through this research project, which might appeal to the educational professionals, students, and readers to be mindful of the hegemonic forces and to be transformative agents acting for the sustainability of the planetary earth, in which all life would flourish, that support enriching the concept of relational becoming.

Ontology: Relational Becoming[2]

I have grown up believing that ME research is a purely scientific discipline celebrated for its notions of unbiasedness, reliability, neutrality, and generalizability (Fernandes, 2022; Lamichhane & Luitel, 2022). Its value-free and acultural amalgamation induces a single and disconnected reality that supports the emergence of an epistemological singularity and ultimately engulfs other ways of knowing (Luitel & Taylor, 2010). It helps establish the supremacy of Western-Eurocentric thought, which celebrates the ideology of certainty, objective epistemology, and a value-neutral posture (Ernest, 2016a), which are far from the lifeworld realities of the historically, socially, and culturally rich people of GSTR. It also instills in practitioners a mental scheme that mathematics already exists as a set of pure knowledge and concepts (Ernest, 1998; Luitel, 2013), thereby negating the conception of relational becoming (Stetsenko, 2017).

In this research, I have embraced the conception of relational becoming as reality. Relational becoming suggests that entities do not remain in isolation; they evolve through continuous interactions. In the context of educational research, it signifies that educational realities remain fluid and can shape or produce meaning through stakeholder interactions explicitly grounded in their sociocultural, historical, and political milieu (Taylor, 2014). It celebrates the conception of interdependency, intersubjectivity, and the coexistence of reality. In this regard, the meaning I have generated in this research is based on the outcomes of interactions with my research participants, the current sociocultural, historical, and political scenario, and the prevailing discourse in ME. It also offers my readers a space to make meaning from the texts by incorporating their social, cultural, historical, and political contexts.

Moreover, a relational ontological stance in an auto/ethnographical research context suggests embracing a 'relational self ' that contrasts the Western conception of 'self ' as an independent, unrelated, superior, and all-in-one creator, observer, and interpreter of the phenomena (Kanu, 2005). This egocentric colonial notion leads researchers to believe that the world is theirs and that their values, perspectives, and convictions are superior to those of others, thereby making meaning in their own terms

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(Kanu, 2005). The relational becoming focuses on intersubjectively and dialectically constructed realities embedded in our social, political, cultural, and historical contexts.

In this connection, I have been inspired by the Samkhya philosophical perspective. It describes reality as relational becoming, manifested through the bidirectional interaction between *Prakriti* and *Purusha*. *Prakriti* exists and evolves for the sake of *Purusha*, and *Purusha* exists as the cultivator of *Prakriti*. The entire universe has been forming through the interaction of *Prakriti* and *Purusha* (Biswas & Prakash, 2022; Keith, 1975). Likewise, Vaisheshika philosophy also teaches me to embrace views of reality in the form of relational becoming, which describes *Dravya* (substance), *Guan* (qualities), *Karma* (activities), *Smanya* (universal), *Vishesha* (particular), and *Samavaya* (inherence) as the essential components that are in the continuous interaction process underpinning the existence of the entire world (Perrett, 2016). That is, reality is in the process of becoming, which never exists in isolation.

Moreover, Buddhist philosophy also describes that there is no permanent being from which all spring. The Buddhist theory of dependent origination states that the world is in constant process (becoming) of integration and disintegration of its units (Stcherbatsky, 2008). In this regard, the concept of relational becoming has been further clarified by the famous Nepali adage, *Mato Ko Bhar Dhunga Lai* and *Dhunga Ko Bhar Mato Lai*. Literally, it means that nothing exists independently; everyone needs the support of others for their evolution and is in the process of becoming. For instance, a seed germinates with the help of soil, sunlight, and other micronutrients, it becomes a tree. There is also an inherent quality of seed germination. A tree is a relational becoming that needs soil, sunlight, water, and human care to grow. That is, reality is a form of becoming, which is continuously re/de/constructed through the struggles within social, cultural, and historical settings and through the world's power dynamics. I have captured such a dynamic, ever-changing reality through multiple modes of exploration.

Epistemology: Honoring Pluralism[3]

I have come to realize that the Western-Eurocentric conception of knowing appears brutal to other ways of knowing that lack a culture of mutual respect (Chilisa

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et al., 2017; Takayama et al., 2017). It is nothing but a reflection of the asymmetric power relations between Western European colonizers and GSTR countries. Through the excessive exercise of power, Western European countries have produced the human sciences, including mathematics, and established the notions of generality and certainty of knowledge, as well as a singular mode of knowing that disinherit the non-Western world of epistemology (Chilisa et al., 2017; Taylor, 2014). It made me aware and led me to incorporate emerging and empowering ways of knowing that acknowledge participants' voices, narratives, and social, cultural, historical, and political contexts.

I do not confine my research activities to exploring universal and objective knowledge that appears independent of my research participants and their social, cultural, political, and historical context. Here, I recall Willis's view that any form of knowledge constructed or created under certain circumstances (through a long socio-historical and political landscape) may or may not be valid and/or consistent in other contexts (Willis, 2007). In this regard, I have realized that knowledge is not constructed in the ivory tower of expertism, but rather historically, hermeneutically, and dialectically (Vaidya, 2024; Young, 2016). It indicates that knowledge is contingent upon history, the socio-cultural milieu and the power dynamics of society and nation. Acknowledging these processes of knowledge construction, I have sought to explore the socio-cultural, historical, and political realities of ME in Nepal through various genres, in collaboration with my research participants as co-constructors of knowledge (Taylor, 2014). I have used my research participants' narratives, my own lived experiences, metaphorical and poetic logics, and non-verbal logics (images and cartoons) to generate the field texts through the constant interplay among these attributes (Murti, 2008; Taylor, 2014). Moreover, I have employed the *Sashastra—Vade Vade Bodha Tyato Jayate* (literally 'reality can be explored through dialogue and debate') to explore the lived experiences of my research participants and myself.

Multiparadigmatic Design Space

The nature and purpose of my research—exploring the hidden interests behind the colonial legacy that constrains Nepali ME within a narrow, Western-Eurocentric, singular ideology and envisioning inclusive ME in Nepal—along with my philosophical positioning, lead me to embrace diverse perspectives and ways of exploring, interpreting, and meaning-making. In so doing, I have deployed a multiparadigmatic design space comprising criticalism, interpretivism,

postmodernism, and integralism, which enables me to explore my research issues and enrich interpretative and meaning-making processes.

Criticalism: Taking a Stand

In my research, a paradigm of criticalism has played a vital role. It has enabled me to unmask and challenge oppressive forces embedded in ME and envision an inclusive ME. In doing so, I have uncovered a vicious circle of hegemonic ideology, including scientism, crypto-positivism, and foundationalism, which function as invisible weapons to maintain the powerful presence of Western-Eurocentric thought in ME (Bishop, 1990; Kincheloe & Tobin, 2009). The paradigm of criticalism always supports me to be mindful in every step of my inquiry and propel me to raise the questions—whose knowledge is being recognized, whose voice is heard, and whose values and perspectives are renowned, while exploring the field texts, articulating my lived experiences, and interpretation and meaning-making process.

A notion of critical self-reflection within this paradigm also enables me to become critical of my own experiences (self/auto) and social practices (ethno/other), generating rich textual information (data). Likewise, it enables me to challenge the taken-for-granted assumptions, values, and imperatives that propel inequalities, social injustice, and power imbalance in educational institutions, society, and nations (Giroux, 2020b) that prevent the 'deep democratic' practices (Kincheloe & McLaren, 2000) within and outside the school premises. I am also conscious of the totalitarian perspective of criticism. To set aside the totalitarian perspective of criticalism, I have also employed an interpretive paradigm that offers sufficient space for me to engage in a thick descriptive process (Geertz, 2003) to uncover not only the political issues—small pond of criticalism—but also the social, cultural, and historical contexts of the research.

Interpretivism: Grounding in the Context

I have realized that exploring the colonial legacy embedded in Nepali ME requires thick description, prolonged engagement, and an insider's understanding of the phenomenon (Geertz, 2003), which compels me to adopt an interpretive paradigm. It helps me explore the context-based, intersubjective meanings embedded in sociocultural practices, beliefs, values, and historical connotations of both the research participants and myself. Likewise, the paradigm of interpretivism also enables me to excavate the experiences of communities (my research participants) and their worldviews by "standing in their shoes, looking through their eyes and feeling their

pleasures and pains" (Taylor & Median, 2011, p. 4) for the holistic understanding of the phenomenon. It allows me to portray the ever-unfolding intricacies of colonialism, hegemonic ideologies, and their subtleties (Taylor, 2014; Luitel, 2019). Moreover, interpretivism informs me to proceed with an open-ended research design that allows for emergent modes of inquiry, research questions, and an evolving structure of writing and reporting to make the research livelier (Taylor et al., 2012). In-depth descriptions and interpretations are necessary to understand sociocultural practices, but they are not sufficient for embracing plurality, thereby creating transformative practices. For this, I have employed the postmodern paradigm to explore multiple perspectives and develop an eagle's eye view to explicitly and exclusively represent the phenomena under consideration.

Postmodernism: Multiple Representation of Realities

The postmodern paradigm enables me to develop pluralistic visions through re/viewing, re/thinking, re/reflecting, and de/reconstructing the disempowering notions of mathematics as a pure body of knowledge (Luitel, 2013) and the embedded colonialist culture (Taylor et al., 2012). Deconstructing colonial knowledge and dissolving the existing dichotomy fosters the grounds for envisioning an inclusive vision of ME in Nepal. The disempowering dichotomy between two cultures—Western and Eastern, local and global, South and North, etc.—does not foster holistic visions, a central purpose of my research. In developing an inclusive culture, two forms of enculturation (Luitel & Taylor, 2010) must be embraced to recognize the unique contributions of every culture in creating inclusive ME, where learners from both cultures feel empowered. In so doing, postmodernism has enabled me to employ multiple genres, including metaphorical, narrative, poetic, dialectical, and non-verbal, to make meaning of the mathematics curriculum, pedagogy, and assessment in the context of Nepal (Luitel, 2009).

Integralism: Making Holistic Meaning

I did not propose using the integral paradigm in my research when I defended my proposal. I have only described the roles of three paradigms: criticalism, interpretivism, and postmodernism. The paradigm of criticalism offered a critical outlook under the postcolonial research space needed to unearth the hidden colonial legacy perpetuated and shaped our education system in general (Regmi, 2023) and ME in particular (Lamichhane & Luitel, 2023a; Luitel & Taylor, 2010), to reflect upon my experiences as a student, mathematics educator, and practitioner researcher, which

makes my research transparent to the readers. The interpretivism paradigm helped me explore the contextual realities of ME as an insider researcher. It enabled me to understand the intersubjective meanings of ME by standing on the feet of my research participants (Taylor & Median, 2011). Finally, the paradigms of postmodernism offered a space to employ multiple genres for cultivating different aspects of ME in our context. To integrate all these attributes, generate holistic meaning, and envision an inclusive ME, I have employed integralist paradigm.

As I mentioned in the above section on the philosophical underpinning of my research, I believe that ME is a dynamic and evolving discipline that does not exist in isolation. The integral perspective prompts me to think holistically, such as metaphorically, symbolically, and eclectically (Saldana, 2015). Metaphorical thinking helps me capture the emergent meaning rather than propositional meaning, and to compare complex phenomena with familiar objects and adages by connecting the narratives and stories of my research participants within the context. Likewise, I have used symbols, figures, and pictures to link the generated meaning to the social and cultural practices of ME. Moreover, eclectic thinking has led me to move beyond a narrow conception of mathematics and has provided sufficient space to incorporate spiritual and ecological perspectives (Wilber, 2007) into my research, thereby supporting the integration of interdisciplinary views in ME. Arriving at this stage, I felt that by drawing on multiple paradigms, I can envision mathematics curricula, pedagogical practices, and assessment systems by reconceptualizing ME, instigating the views of holism, humility, spirituality, and ecology to address the complex and burning problems and challenging needs of the 21st century (Taylor & Median, 2011; Wilber, 2000, 2007).

The concept of holism supports my exploration and imbues me with relational, interdependent, and coexistence/co-arising aspects by highlighting the inseparability of zoe, eco, and techno visions in ME (see Chapter IV). I have realized that the compartmentalization of modern science into different disciplinary silos would not address the needs and crises of the 21st century, because the fragmentation of disciplines into separate silos provokes the misconception that the whole is equal to the sum of its parts (Sri Aurobindo & McDermott, 2005; Wilber, 2000). The concept of humility helps foster a modest view of others' perspectives, values, and opinions, creating a living environment within and beyond school premises that promotes the well-being of learners and society. I adopted a spiritual perspective to broaden the

concept of learning, encompassing not only intellectual discourse but also physical, emotional, aesthetic, and spiritual aspects, thereby promoting the holistic development of learners (O'Sullivan, 2002). Finally, I incorporated an ecological perspective to enrich the concept of coexistence and mutual dependence between human beings and the rest of nature, thereby promoting the sustainability of the planet and its potential for the flourishing of all forms of life. I attempted to integrate this paradigm through dialogical and dialectical logics, which emphasize inclusive thinking over absolutist and dualistic thinking, to envision an inclusive ME in Nepal.

From the above discussion, I have realized that these four paradigms help deconstruct the post-positivist notion of ME research. The post/positivist rhyme on research generally demarcates the interdependent, dependent-origination, harmonious, and complementary subjects into mutually exclusive attributes. The demarcation of west and east, pre and post, south and north, pure and impure, subjective and objective, abstract and concrete, analytic and synthesis, deductive and inductive, etc., does not facilitate a holistic understanding of the phenomena (Luitel, 2009). Due to their interdependence, these constructs cannot convey meaning without their counterparts. Paradigms of criticalism, interpretivism, postmodernism, and integralism underpin postcolonial research, allowing me to embrace multiple logics, genres, and methods to create inclusive worldviews, values, cultures, ideologies, and epistemologies, thereby enabling me to envision a transformative ME.

Postcolonial Auto/ethnography as My Research Method

In this subsection, I first discuss how I entered the field of auto/ethnography during my academic journey, and then outline the attributes of a postcolonial auto/ethnography that I have incorporated to navigate this research project.

Entering into the Field of Auto/ethnography[4]

I graduated with a Master of Education (M.Ed.) in ME from Tribhuvan University (TU) in 1999. The M.Ed. program at TU included a dissertation as an optional course. It seemed contradictory that students who wanted to write a

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dissertation were not allowed to take a research class, while those who were not eager to do so were offered an alternative research course. I decided to write a dissertation. I encountered numerous challenges navigating my research journey due to inadequate knowledge, techniques, and skills in educational research methods.

There was a two-to-three-hour orientation class for students who were enthusiastic about writing a dissertation. I learned some of the basic constructs of scientific research from the orientation class. It focused on how to use scientific research design and technique in ME research. The facilitator repeatedly highlighted the attributes of scientific research, emphasizing that researchers must set aside their personal beliefs, convictions, values, and experiences and adopt a neutral attitude. At a glance, the scientific research methodology sounds good, enriching my basic understanding of the research. I completed my Master's research project, titled "A comparative study of primary level students under grade and subject teaching". However, I faced some difficulties during the field visit. Some of my research participants expressed dissatisfaction with a closed questionnaire because it restricted to express their views freely. I had no solution to their queries. I tried to convince them that the university professors approved the questionnaire and allowed me to do the fieldwork. I felt they were not fully satisfied; however, they filled out the questionnaire.

Over time, I had the opportunity to supervise a master's-level research project. It again recalled my own experiences of doing a dissertation. There was a lack of senior professors/lecturers with sufficient expertise in supervising dissertations at my host institution, as it was the first batch of our institution. It presented some challenges to the ME department on our campus. We (the faculty of the ME department) decided to bring the latest research books, articles, and journals to the library hoping to facilitate our supervision of students' dissertations.

After reviewing the available literature, our department decided to conduct a three-day dissertation-writing workshop to enhance the research concepts, knowledge, skills, and techniques of concerned students. In doing so, I was assigned to facilitate a session on qualitative research design. I became perplexed about how to facilitate the session because I had no experience in doing qualitative research. I was wondering if I could search for appropriate books/articles to prepare for the workshop. I found a book entitled "Contemporary Qualitative Research: Exemplars for Science and Mathematics Educators" (Taylor & Wallace, 2007), which had just been added to our library. I went

through the book and found it more evocative. Among the many chapters in the book, "Storying, Critical Reflexivity, and Imagination" (Luitel, 2007) was particularly valuable for exploring the contextualization of Nepali ME. It also revealed the researcher's and participants' roles, which were quite disparate from what I learned in scientific research methodology. These two events were eye-openers and encouraging me to pursue alternative research designs in ME.

Critically reflecting on my research journey led me to consider a research design that has provided sufficient space for my research participants and me to express personal beliefs, convictions, sociocultural and historical perspectives, and the power dynamics of society, nation, and the world. It stirred a deep sense of curiosity within me and gave rise to questions that were both propelling and connecting in my mind. Are there any research designs or methods that incorporate participants' voices, values, and perspectives? Are there any research designs and techniques that recognize the importance of integrating social, cultural, historical, and political aspects? These questions increased my enthusiasm for pursuing alternative research, leading me to enroll in the Master of Philosophy (MPhil) program at the Kathmandu University School of Education (KUSOED), where I gained familiarity with innovative research paradigms and methodologies.

Course offered in Master's Degree in ME in 1999 at TU
Ed I: Foundation of Education
Ed II: Learning Theory and Evaluation
Math I: Statistics and Operation Research
Math II: Higher Geometry, Numerical Analysis and Differential Equation
Math III: Math Analysis
Math IV: Foundation and Historical Development of ME
Ed III: Dissertation or Research on Education
Ed IV: Practicum (Teaching practice)

Box 5 *Mathematics Education Curriculum of TU in 1999*

During my journey, when I was a student of MPhil in ME at KUSOED in 2015, I got an opportunity to engage with non-positivist (non-colonial) research paradigms and emerging alternative research methodologies. These methodologies seemed strange because I was taught and grew up with the scientific research method. I came across alternative research paradigms (interpretive, critical, postmodern, and integral) and methodologies (ethnography, narrative, phenomenology, case study,

autoethnography, etc.), which are very challenging for me. However, I accepted them because I had already encountered a situation in which my research participants raised questions when they were not allowed to express their lived experiences in the name of doing scientific research.

Among the various methodologies, I was impressed by the auto/ethnography because it provided a space to incorporate personal, social, and cultural experiences as authentic texts. I employed autoethnography in my MPhil dissertation to uncover my images of mathematics, pedagogy, curriculum, and assessment, I had un/knowingly limited to digging out most of the internal (central to the periphery, metropolis to the rural, institutional role, curriculum formation process, a pedagogical approach adopted by teachers, assessment systems used in assessing the students' learning, etc.) factors without having conscious and mindful gazes towards the external (power relation of the Western and non-Western nations, perspectives and ideologies, techno-cultural tools, etc.) forces, even though I had used critical paradigm (Lamichhane, 2019). I understood that without conscious and mindful engagement, there is a high possibility of being influenced by a colonial agenda, which confines the researcher's autonomy to express their lived experiences, thereby impeding free and pure discourse (Taylor & Williams, 1992).

The colonial post/positivist research paradigm has not acknowledged worldviews and onto-epistemic practices of people from GSTR (Thambinathan & Kinsella, 2021). It seems unable to critique its detrimental effects in academia (Luitel & Taylor, 2010) and its overall impact on the nation-building process and well-being (Regmi, 2023). Here, I do not intend to blame researchers for having to endure the colonial agenda in universities and other sectors of the nation. However, my concern is that our education system seems to fail to empower us to become critical and imaginative explorers, which might lead to uncritical adoption and blind imitation of foreign curricula, pedagogies, and assessment systems in ME (Lamichhane, 2019; Luitel, 2009). An imprudent adoption of Western mathematics could not bridge the gap between learners' educational activities and their lifeworld. It is far removed from the real-world problems and lives of Nepali learners and consequently blurs the colonial research agenda (Wagle et al., 2019).

At this point of inquiry, I have understood that ME research is a political activity that can conceal the perpetuated inequalities, social and epistemic injustices, and present crises of the world in favor of a minority of the ruling class in the local

context and colonial power centers in the global scenario (Lamichhane & Luitel, 2023b). Likewise, it also helps unearth the hidden agendas, strategies, and secret interests of mainstream groups and powerful countries. It depends upon the selection of the research paradigm and method. Researchers who follow the post/positivist paradigm and its informed methodology fall under this category and adopt the so-called neutral attitude in the name of producing generalizable knowledge (Taylor et al., 2014). And those who embrace non-positivist research paradigms and their corresponding research methodologies delineate the second path. In this regard, I have opted for the second path, adopting a postcolonial posture in auto/ethnographic research to guide my research journey. I turned my attention to portraying the attributes of postcolonial auto/ethnography and how I employed it in my research.

Postcolonial Auto/ethnography: Unearthing Colonial Legacy[5]

I have just described in the previous section that I do not restrict my inquiry to particular privileged views, perspectives, and approaches. I have employed a more flexible and emergent inquiry process to explore the multifaceted aspects of ME, providing me with sufficient space for critical reflection on my experience. This approach has allowed me to examine existing situations through the narratives of my research participants and envision the future direction of ME. It seems impossible to explore such a complex phenomenon at a 'high deep' level of consciousness (Saldana, 2015) without bringing insider views, perspectives, and lived experiences through prolonged engagement. I must choose an appropriate research methodology and writing methods to calibrate the aforementioned attributes. In this regard, I agree with the views of Boylorn and Orbe (2014) that among the different approaches of qualitative inquiry, auto/ethnography is one of the methods useful to explore social, cultural, and historical embeddedness, to unmask hegemonic ideology, and to unearth oppressive power presence in ME through insider lived experiences.

An auto/ethnography is both a research method and a process of writing that portrays (graphy) the personal experiences (auto) along with cultural experiences

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(ethno) to understand the phenomenon under study (Adams et al., 2015; Adams et al., 2021; Ellis, 2004). It allows me to examine my epiphany (Denzin, 2014), which is not isolated but situated within relationships with others. When I use auto/ethnography, I focus on relational patterns of experience—encounters, reactions, and interactions that unfold continuously as I engage in social, academic, and professional activities. Recognition of the individual self as situated in cultural, social, and political contexts supports the exploration of synergetic pictures of existing forces that shape personal, social, and institutional activities. The auto/ethnography—as a method and a mode of representation through individual and collective narratives unearths canonical narratives and institutional forces that implicitly reign over educational institutions and society, helping develop a collective consciousness that can make a more profound contribution to social transformation (Adams et al., 2021).

Moreover, it indicates that auto/ethnography is not simply a plain description of my individual lived experiences; it orients to connect personal (insider) insights, conviction, and knowledge to a larger social, relational, cultural, and political (others or outsider) scenario to generate a holistic understanding of the phenomena (Adams et al., 2015). Similarly, the transformative intent of auto/ethnography offers thick descriptions, providing a deep understanding of the phenomenon rather than generating general information about a large population, thereby intensifying its critical and socio-political astuteness (Qutoshi, 2015).

It enables me to recognize social differences and identity politics, develop a culture of respect, and acknowledge other ways of knowing, being, and doing (Stetsenko, 2017).

Here, the concept of colonialism extends far beyond the geographical conquests of the 18th and 19th centuries, and manifests through technological advancements, physical infrastructural development, linguistic encroachment, and neoliberal political-economic policies (van Stam, 2017), and is underpinned by educational research and curricular practices. In this connection, describing the significant attributes of auto/ethnography and its transformative intents, Allen (2011 as cited in Qutoshi, 2015) argued that it is a research method and way of writing that works as

> an un-locker that opens the hidden window to view unseen things; a revealer that exposes sociocultural delicacies and/or intimate secrets of self/others; a healer that creates empathy and sympathy for being victimized and or marginalized; an energizer that empower the

> powerless to fight against inequalities; a challenger who fights to disrupt canonical ways of seeing, believing and doing things as taken for granted; an enabler that develops capacities in self/others; and a change agent who creates feelings of emancipation in society, to name but a few. (p. 162)

It elicits a postcolonial posture of auto/ethnography that enables me to depict the colonial forces, thereby compelling me and my readers not to be sideline spectators of social, cultural, and political embodiment in educational processes, but to be active agents (Boylorn & Orbe, 2014). It also helps me to break my narrowly conceived notion of ME research, which is underpinned by the post-positivist paradigm, and to employ autonomous scholarship that incorporates our (my research participants and I) worldviews, perspectives, and epistemologies, thereby supporting the deconstruction of the colonial legacy in educational research (Chilisa et al., 2017).

Due to the colonial authority and surveillance of the hegemonic power structures pervasive in the academy, we could not include local epistemologies, beliefs, discourses, and historical knowledge into our curricula (Apple, 2019) and research process (Adams et al., 2008; Naomi, 2021). The consequences are that we forgot to tell our new generation that we have our own rich sociocultural and historical practices of ME (Shrestha, 2008). In this context, my postcolonial posture toward auto/ethnography provides sufficient space to generate a wide array of textual data through multiple genres.

Embracing multiple genres in postcolonial auto/ethnography research enabled me to generate layered writing through critical reflection on my lived experience and participants' narratives (Richardson & St. Pierre, 2018). The multi-layered exploration of the sociocultural, historical, and political embeddedness in ME helps develop eagle-eyed views that support drawing the holistic meaning of the phenomena. To make holistic meaning, we need to recognize social, cultural, historical, and political dimensions of the mathematics that enrich inclusiveness, social justice, and epistemic equity and empathetic attitudes, thereby developing agency in learners (Bochner, 2020; Chilisa et al., 2017) that opens a path to transform conventional ME into a transformative one.

Despite having rich cultural diversities of the non-Western historical nations, the colonial power centers devalue and ignore the local epistemologies (knowing through dancing, singing, storytelling, experiential experience, poetic, etc.),

sociocultural and historical knowledge and values (Wagle et al, 2019), and thus make ME disconnected from the lifeworld of learners.

In this regard, to avoid colonial legacies, I have incorporated Shad Darshan epistemology; *Shravana* (narrative, storytelling, and sharing), *Manan* (critical reflection on practices), and *Niddhyasana* (deep engagement; connecting mind, body, and soul) (Reagan, 2018). Similarly, multiple and inclusive epistemologies, informed by Buddhist philosophy (Koirala et al., 2021), were found to be significant in disrupting the hegemonic presence of modern post-positivist epistemology.

Modernity and coloniality appear to be two sides of the same coin. The Western modern perspective on research often strives for epistemological closure and the exclusion of other forms of knowledge, brutally ignoring the room for alternative, imaginative, and visionary discourses (Paraskeva, 2016; Santos, 2016). Describing the historical violence and exploitation of the colonizing approach to research and education, Ce′saire (1955) mentioned that "modern goitrous academics were tools of capitalism and supports of plundering colonialism, all of them responsible, all hateful, all henceforth answerable for the violence of revolutionary action" (pp. 54-55). In this context, I have employed a postcolonial auto/ethnographic research approach to uncover the forces that restrict ME within the colonial propagation and to offer an alternative ME that includes the voices, perspectives, languages, and values of GSTR people.

Postcolonial Auto/ethnography: A Dialectical Space[6]

Postcolonial auto/ethnography enables me to uncover how the legacy of colonialism has been embedded in social science research, especially in the GSTRs countries. It focuses on addressing the long-standing dichotomies: Western versus Eastern, local versus global, subjective versus objective, neutral versus value-laden, among others, for a holistic understanding of phenomena. To dismantle dualistic thinking in ME research, the dialectical way of knowing is significant. It is a process of constructing, deconstructing, and reconstructing the meaning of the phenomena

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under study to create complex, holistic, and dynamic perspectives. To generate holistic meaning through a dialectical perspective, my research participants and I became one, as the meaning we generated through our interactions incorporates our values and perspectives (Gadamer, 1976, as cited in Wong, 2006). In this regard, postcolonial auto/ethnography offers various forms of logic, including Hegelian, negative, and Lila-Rita dialectics.

Hegelian dialectic is a process of meaning-making in the presence of seemingly contradictory situations and arguments. It focuses on attaining an immanent transcendence by rejecting the linear, reductionist, causal, and one-sided approach inherent in thinking (Wong, 2006). Its key feature is an acceptance of the dynamism of reality, which is in a state of internal change due to the struggle between inherently embedded contradictory views, concepts, and attributes (Rescher, 2006), and external forces further amplify these changes. In so doing, we need to embrace these contradictory attributes, as these constructs are not independent; they co-arise and may have lost their meaning without the presence of others.

Buddhist philosophers have described the ideas of co-arising; among them, a negative dialectic of Nagarjuna (a second-century Madhyamika Buddhist sage) seems to be most significant because it embraces a nonessentialist view that gives rise to the impermanence, fluidity, and dynamism of reality and thus denies any worldly categories of ideas and things (Luitel, 2013; Westerhoff, 2009). The primary purpose of Nagarjuna's negative dialectics is to illuminate the view that reality has no inherent self-existence. Nagarjuna’s principle of dependent co-arising is beneficial for understanding the nature of ME in Nepal because it has two-fold implications. First, we make sense of self in terms of others and vice versa. Second, we make meaning of non-Western thought in the context of Western Eurocentric thought. It involves exploring inter/subjective epistemologies in relation to objective epistemology, as well as local knowledge in contrast to global knowledge, and vice versa. In this context, the great physicist Niels Bohr argued that we might not be "easily categorized as belonging to either the East or the West and gave a thought-provoking dictum that the opposite of the profound truth may well be another profound truth" (Wong, 2006, p. 238).

Moreover, the logic of neither this nor that, as found in *Advaita Vedanta*, a special form of *Vedanta Darsana* (philosophy) compiled and circulated by Shankara (Davis, 2010; Luitel, 2013), is also significant in postcolonial auto/ethnography

research for generating holistic meaning. The concept of *neti-neti* (not this, not that, neither this nor that) of *Advaita Vedanta* empowers me to challenge the hostile attributes of human beings that favor one over another, which finally leads to darkness (Davis, 2010; Hirst, 2005). According to *Advaitin* literature, the dynamism of attributes—ideas, texts, philosophy, social and political milieu, and experience—plays a crucial role in excavating the eternal reality rather than the apparent reality (Hirst, 2005). This dialectical reasoning leads us to create an in-between space by incorporating the most contentious categories of Western Eurocentric thought and non-Western historical hermeneutics. Indeed, postcolonial auto/ethnography research is neither convergent nor divergent. It encourages me to dance among the diverse perspectives to unmask the complexity and chaos embedded in the 21st-century complex world.

Likewise, the idea of Lila-Rita dialectic in Vedic traditions can be another powerful and empowering construct in the field of social science research, taking into account the agendas of social inclusion, justice, and deep democratic practices (Panikkar, 1977, as cited by Luitel, 2019). The idea of Rita seems equivalent to Western rational and analytical reasoning, which follows specific rules and procedures to achieve intended goals and is best suit to exploring the functional relationships among observable and measurable phenomena. In contrast, Lila refers to the mythopoetic representation of *Shiva* (Hindu God) and *Parvati* (Hindu Goddess), playful acts, and the dance of *Nataraj* (a form of Shiva). It provides a space where researchers can adopt different postures in response to the dynamic relationships among the forces immediately at play in the inquiry process. In this regard, as a postcolonial auto/ethnographer, I use Lila-Rita dialectics as a referent, in which Rita explains the order developed from the academic, professional, and personal journey, and Lila helps incorporate emergent multi-epistemic activities (Luitel, 2019). Indeed, to enrich empathic interactions and fusions of seemingly opposite views, ideas, and categories, dialectical spaces significantly contribute to generating the holistic meaning and thereby support the creation of transformative praxis.

Postcolonial Auto/ethnography: Transformative Praxis[7]

Postcolonial auto/ethnography explores untold narratives and unheard voices, particularly those of marginalized groups. A dialectical interplay of data and voices, sense and emotion, descriptions and visions, analytical and perspectival, minds and bodies, theory and practice, intimacy and reciprocity, among others (Denzin, 2019), gives rise to informed action, thereby leading to transformative praxis (Freire, 2005; Grundy, 1987; Maseko, 2018).

Transformative praxis rejects the notion of a linear or causal relationship between seemingly binary constructs that prevail over others. It is a reflexive relationship in which one is complementary to, and interdependent with, the other. A notion of transformative knowing involves a dialectical interplay between action and reflection and theory and practice, to inform new actions (Johns, 2017). In an educational enterprise, transformative praxis encompasses critical consciousness, culturally responsive critical pedagogy, and an emancipatory interest in resolving humanitarian crises (Freire, 1993, 2005; Grundy, 1987; Habermas, 1972; Navarro, 2018). In this regard, I have realized that methodologically, transformative praxis can have a substantial nexus with reflexive research traditions such as narrative research, "participatory action research, art-based research, transformative research, critical policy research, and auto/ethnographic inquiry, to name a few" (Luitel & Dahal, 2020, p. 1).

In a postcolonial auto/ethnographic inquiry, I used transformative praxis as an emerging and flexible approach that focuses on unwrapping the disempowering notions such as; curriculum as the product (c.f., curriculum as a praxis), informing pedagogy (c.f., transformative and critical pedagogy); standardized assessment (c.f., holistic assessment) passive recipients (c.f., active practitioners) etc., through the critical reflective practices. In so doing, Johns' (2017) ideas of retrospective, ongoing, and anticipatory forms of reflection can be helpful for holistic understanding and meaning-making. These three types of reflective practices support critically assessing

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past events, identifying problems and ways to revive and enrich present actions, and envisioning future possibilities that open a path to navigating social transformation (Freire, 1993; Grundy, 1987; Johns, 2017; Luitel, 2019). It signifies that critical reflection is not simply the description of daily actions. However, it is a conscious and critical assessment of the implicit and explicit forces that shape the history of ME, govern current practices, and influence its future direction. Engaging in critical reflective practices helps recognize the different forces that have positive or negative impacts on ME from the very beginning of curriculum design, pedagogical practices, and assessment systems, thereby developing practitioners' willpower and agency so they can contribute to transforming ME. At this point in the inquiry, I have realized that to unearth the colonial legacy in ME and envision the transformative ME, I need information-rich participants (Patton, 2002).

Research Field and Participants

I have just mentioned that I used postcolonial auto/ethnography as my research methodology. The central premise of postcolonial auto/ethnography is to explore and dismantle the colonial legacy to envision an inclusive ME. There is no particular geographical research field; however, the ME practice of Nepal is my field of exploration. In Particular, I have focused on curriculum, pedagogy, and assessment practices in ME in Nepal, which comprise my field of study. My inquiry is highly context-based and requires research participants to have rich information and a critical perspective (Dahal et al., 2024). To meet my requirement, I have purposively selected research participants (Patton, 2002). Likewise, my purposes are to understand how the colonial legacy is perpetuated in ME, identify the forces behind it through prolonged engagement, and envision an inclusive ME. In doing so, a large number of participants are not helpful in the in-depth exploration of my issue. Given this, only five research participants were selected.

As I have employed auto/ethnography as my research method, I am, by definition, one of the research participants (auto: individual self, as an insider practitioner). I have selected five other research participants (ethno-cultural and relational selves). I was flexible on the number of research participants in my inquiry because my research is highly emergent and context-based. Initially, I selected six participants. During the interactions and discussions, one of the research participants, a retired school teacher, went to Australia to visit his family and withdrew from the study. Likewise, another research participant, a university teacher, could not provide

enough time for interaction and thus left the study. After leaving these two participants, I selected another participant to address gender inclusion in my research. Finally, I have six research participants: Surya, Chandra, Pawan, Bishnu, Durga, and me. To maintain anonymity and privacy, the names of participants and institutions they have served are pseudonyms. Now, I briefly present the backgrounds of my research participants and myself.

I (**Basanta**) am a doctoral student of STEAM education at Kathmandu University School of Education, Nepal. I have been working as a faculty member in the Department of ME at one of the public campuses in Bharatpur, Chitwan, Nepal, since 2005. I also serve as a visiting faculty at Kathmandu University Schools of Education, Nepal. My research interests include ME —curriculum, pedagogy, and assessment; STEAM education; use of ICT and AI in ME and research; and postcolonial qualitative research methods. I have participated in over two dozen national and international conferences, workshops, seminars, and symposia. I have published research articles, conference proceedings, and editorials in various national and international journals. I have also been working as the editor-in-chief of Mathematics Education Forum Chitwan, a peer-reviewed journal, published by the Council for Mathematics Education, Chitwan.

Surya is an ME professor at one of Nepal's universities. He has earned his PhD and Post Doc. in ME. He has over three decades of university-level mathematics teaching experience. He has published research articles, books, commentaries, and conference proceedings in various national and international journals and publishing houses. His research interests include the history of mathematics, Vedic mathematics, and ME. His research significantly contributes to opening the discourse on the historical development of mathematics in Nepal.

Chandra is an assistant professor of ME at one of Nepal's universities. He did his PhD in ME. He has over 2.5 decades of experience teaching mathematics at the university level. His research interests include the ME curriculum, pedagogy, and assessment systems, ethnomathematics, and the use of ICT in teaching mathematics. He has published research articles, book chapters, and conference proceedings in national and international journals and other publications.

Bishnu is an assistant professor of ME at a university in Nepal. He is also a PhD scholar. He completed his Master's and MPhil degrees in ME and has been continuously involved in teaching at the school and university levels for 25 years. His

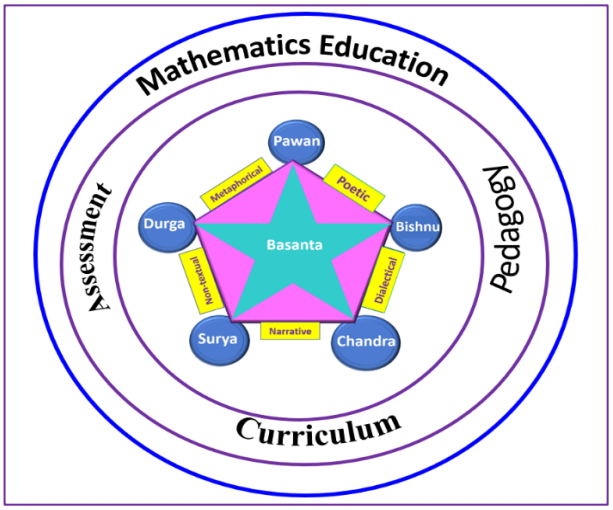
research interests include STEAM education, encompassing curriculum, pedagogy, assessment, and ICT in ME. He has published research papers in journals, book chapters, and conference proceedings in national and international publications, as well as in publishing houses. He has also delivered talks on various issues in ME at national and international conferences, workshops, and seminars.

Durga is a senior mathematics teacher. She has been working as a mathematics teacher at one of the institutional schools in Kathmandu Valley for 15 years. She has earned his Master's degree and MPhil in ME. She is interested in using locally available materials and cultural artifacts to teach mathematics and to develop conceptual and relational understanding of the subject.

Pawan is a senior mathematics teacher at a government school. He also works as a teacher trainer. He earned his bachelor's degree in Mathematics, a one-year B.Ed. in ME, and an M.Ed. in Educational Planning and Management. He has over three decades of experience teaching mathematics at the school level and approximately one decade as a teacher trainer. He also has a keen interest in postcolonial literature.

Figure 7

Research Field, Participants and Genres of Writing



Generating Field Texts

I employed a multiparadigmatic postcolonial auto/ethnographic research design. This methodological approach positioned me centrally in the generation of field texts, their interpretation, and the meaning-making process. I have generated field texts from the lived experiences of my research participants and myself. I articulated my lived experiences in the forms of narratives, poems, vignettes, and reflective notes. Likewise, I generated field texts from my research participants through semi-structured interviews (Brinkmann, 2018).

I used semi-structured interviews because people often appreciate the freedom from structure and are more likely to articulate their thoughts, which can be crucial for

capturing key information necessary to understand their views, perspectives, and practices (Parker, 2005). The primary focus of semi-structured interviews is to explore the lifeworld experiences of my research participants, interpreting and making meaning of existing ME practices to offer inclusive and empowering ME. In fact, semi-structured interviews are conversations conducted to unearth and understand the embedded, implicit, and explicit forces that hold power and control, which are essential to reflect upon for ontological, epistemic practices and ethical reasons (Brinkmann, 2018). It helped me understand the life stories of my research participants, including the most influential events, experiences, circumstances, and lessons learned (Atkinson, 2002; Brinkmann & Kvale, 2015).

In an open-ended conversation, a semi-structured interview can yield knowledge about the conversational world. According to Brinkmann (2018), the conversation is not only a means of communication, but also a process of our lives—our thoughts, emotions, and actions—without which our activities would be merely physiological movements. Meaningful conversions, interactions, and the sharing of ideas are the most essential processes of knowledge production and interpretation throughout humankind's history (Ricoeur, 1991). It is an approach to apprehend reality through honest discourse (Koirala et al., 2021), which is the conversational reality. A conversation is a fundamental way to establish mutual respect and foster harmonious relationships.

An empathetic approach to conversation informed me to take an ethical stance in favor of my research participants, to explore colonial remnants, and to offer an alternative, empowering ME. It is a humanistic approach and method of morality that respects the lived experiences of my research participants, as open conversations can provide a first-order understanding through viable descriptions (Fontann & Frey, 2005). In this regard, my research participants become advocates and partners in my study, hoping to use the results to explore the hidden forces that conceal colonial hubris and encourage us to envision inclusive and empowering ME. In this process, the conversation becomes more human in the wake of social transformation, as historical, political, social, and cultural contexts shape it. These moments are reflected in ideas shared by the research participants during the conversations. Moreover, the open conversions—a form of semi-structured interview embraces the emphatical position that blurs the roles of research participants and researcher, a concern with issues of representation, a questioning of the authority, and a critique of the

disempowering relations of power that help consensual understanding and interpretation (Borer & Fontana, 2012), making it possible to envision an inclusive and empowering ME.

For me, an open conversation becomes a site where my research participants and I come together, undermining the colonial tendencies (Smith, 2012) that focus on a standard form of structured interview in which the researcher reads predesigned questions precisely as worded to every respondents in which they are allowed to respond to what is scripted in the questionnaire (Conrad & Schober, 2008).

In this regard, to make our conversations more plausible and participant-friendly, I remained a good listener, did not interrupt the flow of sharing experiences, and occasionally asked clarifying questions. Our conversations followed a helical path by creating layered texts. In our first-round conversation, we discussed the nature and attributes of existing curriculum practices and possible alternative practices. Before the second-round discussion, I transcribed our conversations, coded and categorized them, and identified key points as themes. It was easy for me because we tried to come to a consensual understanding during the conversations. In the second-round conversation, we dealt with pedagogical possibilities. Similarly, I shared my understanding with my research participants and asked them to critique and provide feedback before we moved on to the third discussion, which was an assessment practice. It took approximately two years (2022-2024) to complete the conversations, transcribing, coding, categorizing, and thematizing of the field texts, as well as the debriefing. I have spent approximately 5 to 6 hours in discussions with each of my research participants to generate the field texts and adapt the writing as a process of inquiry, creating layered texts by employing multiple logics (Richardson & St. Pierre, 2018).

Writing as a Process of Inquiry

The multi-paradigmatic design and a postcolonial auto/ethnography approach encouraged me to examine my values, convictions, and practices through the lens of larger sociocultural, historical, and political contexts. These attributes are not rigid and cannot remain isolated from context. The essence of social realities cannot be captured and presented in abstract form; their meanings lie merely in writing and reading. Therefore, I focus on unveiling their meaning through critical reflective writing of my experiences, which have been implicitly shaped by sociocultural and historical contexts (Richardson, 2003).

The reflective writing practice is a process of expressing uncensored feelings, emotions, belonging, doubts, pain, and pleasure through personal stories that help ventilate my ways of thinking, being, and doing. In my inquiry, such a writing process plays a significant role because it extends my field texts into alternative interpretations and meaning-making processes that broaden my inter/subjective epistemological stance, keeping me away from being hooked on a particular privileged reality, ideology, and value (Richardson & St. Pierre, 2018). It signifies that writing is not only a means of expression that brings ideas that were not there before writing, but also helps in meaning-making (Konblauch & Baranon, 1984, as cited in Elbaz-Luwish, 2002) in the context.

The meaning-making process in an auto/ethnographic inquiry is neither linear nor reductionist. It is a complex and grounded in sociocultural settings that required layered field texts, interviews, personal notes, memos, poems, narrative, and non-verbal texts. I first wrote my narratives to generate such intricate field texts by immersing myself in the larger social, cultural, historical, and political landscapes of ME. I have attempted to relate my lived experiences to the narratives of my research participants and to the existing literature on ME to grasp the essence of these narratives within the Nepali context. Secondly, I critically reflected on my narratives through a theoretical lens, incorporating participants' experiences and analytical arguments to make the narratives more evocative and contextual (Richardson, 2003).

I have created layered writing by generating field texts from the narratives of my research participants and my lived experience, in a sequential order that follows my research questions and employs multiple logics and genres. In doing so, I have used narrative, dialectical, poetic, metaphorical, and non-textual logics and genres to generate field texts. The use of multiple genres and logics helps enhance the viability and liveliness of my writing and meaning-making process (Luitel, 2018).

The narrative genre helps me explore and share untold stories of my research participants and myself, enabling me to capture how colonial remnants persist in the ME of Nepal. It is an emerging research process because stories are construed within a specific time, place, and context (Clandinin, 2022; Taylor et al., 2012). Participant narratives help me understand the lived experiences of my research participants and my own regarding ME practices in Nepal. Narratives are the living stories of research participants and me that enable me to understand social, cultural, and political embeddedness in their beliefs, practices, and actions (Clandinin & Connelly, 2000).

From Dewey's perspective, social and academic experiences are shaped through interaction and continuous engagement in action and reflection (Dewey, 2001). It revealed that individual lived experiences are not inherently inner and intuitively constructed but related to a larger social, cultural, historical, and political context. It signifies that present experiences are informed by past experiential learning and might contribute to an experiential future. Likewise, personal lives' stores of educational experiences are inextricably intertwined with human thoughts, social, historical, and political environments; thereby, listening to and sharing narratives is the most appropriate way to achieve a holistic understanding of the phenomena (Clandinin & Caine, 2008).

Moreover, the tripartite nature—temporality, sociality, and spatiality—of the narrative genre helped me understand and make sense of it holistically, as it encompasses glimpses of past events, present practices, and future possibilities (Clandinin & Connelly, 2000). The concept of temporality in narratives suggests that individual experiences are not static. It is primarily related to time and places and thus always in the process of becoming. The second conception of sociality in narratives indicates that human experiences are subjectively constructed with the broader milieu and surrounding components—other people, societal forces, institutional structures, power dynamics, curriculum and pedagogical practices, assessment systems, and many more that helped me to understand how the colonial legacy is perpetuated in ME (Clandinin, 2022). Finally, the conception of spatiality or place suggests considering the context in which an inquiry occurs and experiences unfold. In the narrative genre, the place of investigation is not merely a passive backdrop but an influential component that actively shapes how experience is constructed, understood, remembered, and told (Clandinin, 2022; Webster & Mertova, 2007). Thus, in my inquiry, narratives of my research participants and myself provide rich information to understand the curriculum policy, pedagogical and assessment approach, cultural influences, social relationships, power dynamics, and influences of the foreign countries and donor agencies in the educational milieu that profoundly impact individual teaching and learning experience, and how individual agency can contribute to theses broader contexts (Adams et al., 2021).

Likewise, dialectical logic helped me reconcile the seemingly contradictory perspectives and values, enabling me to understand the holistic meaning of my research issues and problems. I used the slash (/) to denote the dialectical relationship

between two constructs. Here, my argument is that seemingly opposite entities or attributes do not exist in the absence of the others. The objective knowledge does not have meaning without subjective knowledge, and vice versa. No one is privileged over others, enriching the inclusive views of ME (Taylor, 2014). In this regard, the primary purpose of using dialectical logic in my research is to minimize the contradictions imposed on ME by binary opposite thinking, which favors propositional logic, rather than adopting holistic and inclusive thinking (Wilber, 2007; Wong, 2006). It offered me enough space to dance among seemingly opposite perspectives, views, and knowledge.

I have also employed poetic logic (Saldana, 2015) to express my thoughts and beliefs, exploring existing mathematical practices and envisioning possible inclusive ME. The poetic logic helped me reflect on my experiences, allowing my readers to make meaning by connecting with their own (Prendergast et al., 2009). Likewise, it helps express imaginative, futuristic, and thought-provoking ideas embedded in the researchers' and practitioners' lifeworlds, thereby endorsing viable actions. For me, it is an open, contextual, and evocative way of expressing my views and voice when I feel difficulty articulating them in a general, literal form (Luitel, 2019).

Moreover, I employed metaphorical logic to uncover, represent, and present complex, multifaceted concepts through more familiar sociocultural constructs, proverbs, and sayings that facilitate the meaning-making process (Lakoff & Johnson, 2003). Metaphors play a significant role in imaginative thinking and the meaning-making process (Mullen et al., 2005). The use of metaphorical genre in ME helps address the shortcomings of literal and propositional approaches to understanding and expressing the meaning of a particular subject (content), which often rely on technical terms and terminologies that may be unfamiliar to general readers, thereby obscuring a deeper, nuanced understanding of the phenomena under study. In my inquiry, I have used Schubert's (1986) metaphorical images of curriculum to illustrate its meaning. For example, the metaphors of cultural reproduction and discrete tasks were used to denote the traditional curriculum. Rather than describing the curriculum in literal terms, these two metaphors illuminate traditional curriculum practices that reproduces preexisting, disconnected knowledge and concepts, thereby diminishing creative, critical, and imaginative thinking. In this regard, I have employed metaphorical logic to draw connections and representations across various fields of ME, considering that these components are logical, plausible, and evocative (Saldana, 2015).

Last, but not least, I have incorporated the non-textual genres to capture the essence of the phenomenon under study. I used various cartoons, pictures, and images to represent otherwise neglected voices, values, and knowledge, thereby elucidating meanings and perspectives that cannot be easily conveyed through textual expression (Luitel, 2019; Taylor, 2014). Likewise, I employed non-textual genres to represent and express embodied meanings in my inquiry. In my opinion, incorporating non-textual genres into my inquiry helped cultivate visual imaginations that can illuminate my conceptions and knowledge claims. It also allowed my reader to ponder on it and make meaning through critical reflection on the issues raised by non-textual logic, fostering pedagogical thoughtfulness in readers (van Manen, 1991).

At this point, I have realized that writing as a process of inquiry has undergone a profound transformation, moving beyond the traditional, often rigid propositional form to embrace an innovative, plausible, and viable representation. Integrating narrative, dialectical, poetic, metaphorical, and non-textual logics helped produce layered texts (Richardson & St. Pierre, 2018). Layered texts are rich, multidimensional scholarly texts that include thick descriptions of contexts, the lived experiences of research participants and the researcher, critical reflective writing, metaphorical illustration, poetic expression, and non-textual representations offering nuance and complex interpretations and meanings. Each of the logics I have employed in this research contributes to creating a unique layer of meaning, enriching the quality of my research.

Ensuring Quality Standards

Postcolonial auto/ethnographic research is a diverse, dynamic, and emerging approach with a key concern to deconstruct colonial perpetuation, especially the notions of realist ontology, objective epistemology, and value-neutral axiology of post/positivist paradigm that restrict within the classical approaches of reliability and validity, for promoting pluralistic thinking and logics (Taylor et al., 2012). Likewise, I have employed writing as a method of inquiry that underpins the meaning-making process. To address the quality concern, I have utilized a set of standards of pedagogical thoughtfulness, critical reflexivity, trustworthiness, crystallization, verisimilitude, and solidarity arising from the multiparadigmatic spaces—criticalism, interpretivism, postmodernism, and integralism (Guba & Lincoln, 1989; Richardson, 2003; Taylor & Medina, 2011; Taylor et al., 2012; van Manen, 1991).

Pedagogical Thoughtfulness

In this research, I aim to expose the invisible colonial legacy permeating Nepal's ME and to envision inclusive ME. In doing so, I engaged in critical reflection from the very beginning of my inquiry. I have not urged or directed my research participants to portray their stories or articulate their experiences within my framework; instead, I encouraged them to express their nuanced feelings, emotions, thoughts, and their representations of actions. It does not mean that I do not have guiding questions. I have explored the colonial presence and offered inclusive ME by embracing multiple logics and creating layered texts that encourage readers to examine and reflect on their pedagogical practices (van Manen, 1991). Likewise, the postcolonial rendition of ME explores its multifaceted, complex, and often hidden aspects, inviting readers to reflect on the issues this research addresses. The embeddedness of social, cultural, historical, political, and ecological perspectives in my inquiry into ME makes the texts more educative and more likely to resonate with readers' experiences, as they are not isolated from these perspectives (Taylor, 2014; van Manen, 1991). Moreover, I employed multiple genres: narrative, dialectical, poetic, and non-textual to unearth the colonial legacies and offer inclusive ME in Nepal that supports the readers for a nuanced understanding of the true essences of ME and increases the likelihood of teachers and teacher educators becoming aware of deeply rooted assumptions and awakening to how they become unconscious consumers of so-called pure mathematical knowledge.

Critical Reflexivity

Critical reflexivity is another significant quality standard in my research. It suggests becoming critically aware of invisible external and internal forces that confine ME within a narrowly conceived, singular ideology and hegemonic cultural practices, as well as the tacit beliefs, values, and practices. During the study, I continuously explored and critically reflected on my assumptions, beliefs, and practices, and scrutinized how the Western modern colonial legacy is embedded in our ME that has shaped our curriculum, pedagogy, and assessment practices, and how the Western modern mathematics has urged us to accept this perspective as usual and world standard (Denzin, 2017; Kincheloe & McLaren, 2000). Likewise, to make my inquiry more educative and authentic, I encouraged my research participants to share their genuine feelings, emotions, and experiences by relating them to their ME practices (Taylor, 2014). Finally, I attempted to deploy the spiral ways of critical

reflective practices by acknowledging Brookfield's (1990) views. The spiral ways of critical reflective practice generally proceed through the three stages in my research. Initially, I explored the taken-for-granted assumptions perpetuated in our ME that severely affect our (my participants' and my) beliefs, thoughts, and actions, which help discount creative, imaginative, and critical thinking and actions. After that, my efforts turn to uncovering the external, invisible forces embedded in our ME practices and how they deter non-Western perspectives in ME. Finally, I envision an alternative, inclusive, and empowering ME. To my understanding, this transparent approach of my writing helped enrich the quality of my research.

Trustworthiness

In this research project, I considered writing as a major process of inquiry and meaning-making. It demands prolonged engagement in the field to produce thick descriptions of the context and participants' narratives that possibly unfold the meaning perspectives of their lived experiences. As I have already mentioned, I employed an open-ended, emergent inquiry process to generate layered texts by engaging in critical reflection and providing my research participants with opportunities to track their authentic voices through member checking and debriefing. It helps clarify the implicit meanings inherent in participants' social lifeworlds. This open-ended emergent inquiry process makes my research more viable and transparent, possibly optimizing the trustworthiness criteria (Guba & Lincoln, 1989; Taylor, 2014). Moreover, I employed eminent criteria of trustworthiness, including credibility, dependability, transferability, and confirmability, in my research (Guba & Lincoln, 1989; Taylor & Medina, 2011).

To address the criteria of credibility, I immersed myself in the culture of our mathematics practices through critical reflective practices, which helped me explore and provide a rich description of the context. It became possible because I have been engaged in ME as a student, mathematics educator, and practitioner-researcher for three and a half decades. In the writing process, I presented my joyful and disgraceful moments through realist narrative and confessional writing, which enabled me to explore the holistic attributes or pictures of the phenomenon, providing rich descriptions (Jensen, 2008).

To ensure dependability, I employed emergent inquiry procedures, including dialectical, metaphorical, and non-linguistic logics, to explore the lived experiences of my research participants and myself. I did not feel any hesitation in expressing my true

beliefs, perceptions, attitudes, and re/actions that naturally reflected our mathematics culture. I thought such emergent diverse patterns of natural descriptions of experiences would help enhance the dependability criteria.

I provided a detailed description of the research site, situations, and immediate environment, in which I explored the vignettes and lived experiences of research participants, thereby enriching transferability (Seale, 1999). In-depth descriptions of the contexts, lived experiences, and mathematical examples provided a more expansive space for my readers to compare and contrast their own social, cultural, and institutional contexts with those of my research and make meaning accordingly, thereby helping ensure the transferability of my research.

Finally, ensuring confirmability, I presented my lived experiences creating different plots of dialogues with mathematics educators, teachers, and colleagues, and I have included the narratives of my research participants who have prolonged engagement in ME in Nepal, which helped to illustrate vivid experiences, giving the true essences of ME practices in our contexts. Moreover, I interpreted and made meaning of narratives and lived experiences by drawing on contemporary issues, discourses, literature, real-world mathematics problems, and incorporating diverse perspectives, which made my research more plausible and viable.

Crystallization

To my understanding, the nature of auto/ethnographic inquiry requires multiple and contingent interpretations of my research participants' and my lived experiences to understand the meaning and perspectives of the phenomenon under consideration. To unfold our (my participants' and my) emergent and evolving experiences, which are shaped by sociocultural, historical, and political lifeworlds, I need to observe the research issues from different angles to illustrate how transmutation has occurred throughout our journey. I attempted to uncover my research issue using different logics (as mentioned above) to form a crystal (Richardson, 2003). It reflects externalities (participants' reflections, memo checking, and debriefing) and refracts them within itself (critical self-reflection), creating a dynamic spectrum (Richardson & St. Pierre, 2018; Taylor, 2014) in which we can observe vivid images that help understand the holistic and multifaceted nature of ME in Nepal.

Verisimilitude

A criterion of verisimilitude suggests that research participants' narratives, as well as my stories and vignettes, should be more believable, lifelike, and truthful so

that my writing can elicit emotional and empathetic appreciation from my readers (Ellis, 2004). As mentioned in the previous section, I have used writing as a process of inquiry that encouraged me to provide thick descriptions of contexts and to create stories in which the plot, characters, time, and place seem true for the readers so that they see the connection of their contexts, events, and experiences (Luitel, 2009) and immerse themselves in the texts. In doing so, I have adopted an open-ended writing style that gives readers sufficient space to reflect on and raise questions within my texts, enabling them to interpret and make meaning in their own contexts. I did not enforce the singularity of meanings that can be generalized without considering the immediate environment, historical setting, and power dynamics of society, nation, and the world. It supports making my writing more evocative and imaginative, allowing readers to discover their mathematical culture and representations.

Solidarity

Solidarity is another key quality standard of my research. In my view, research is not just about contributing to a particular discipline; it is also about advancing knowledge more broadly. It is about amplifying voices and recognizing the historically silenced values, ways of living, ways of knowing, and knowledges of the majority-marginalized groups or disenfranchised countries (Lapadat, 2017). To enhance solidarity, I have attempted to exert intensified moral pressure on minority elite groups or ruling classes by revealing their past and present dominating, inhuman, and unjust colonial practices and perspectives (Garbe, 2024). It appeals to them to review their actions and attitudes for building a cooperative, collaborative, and mutually respectful culture in which every person can admire other values, perspectives, and ways of knowing and living that help create a peaceful, happy, and prosperous society, nation, and world in which every person in the world can live a dignified life (Smith, 2012). To establish the solidarity means to shift the focus from the particular worldview, onto-epistemic practice, and sociopolitical and cultural supremacy to an inclusive worldview, pluralistic onto-epistemic practices, and an inclusive and equitable sociopolitical system and cultural harmony that make our societies, institutions, and nation a garden in which diverse flowers flourish that illuminate the beautiful scenarios.

To address this standard, I have utilized the multiparadigmatic research space, in which I portrayed reality as a process of relational becoming, honored plural epistemologies, and revealed the power dynamics as the value of my inquiry. I do not

aim to disseminate my inquiry process and the so-called conclusion of my research; instead, I have opened a discourse and provided a forum for dialogue for my participants and readers that encourages reciprocal learning, thereby leading to mutual transformation (Adams et al., 2013). Through this, I aim to convey the idea that no person is an island; we live relational lives, and our identity is also a relational identity constituted in the context, time, space, and our actions. In this regard, our (my research participants and I) auto/ethnography stories of experiences are not wholly our own; they implicitly and explicitly implicate relational others that resonate with the conception of solidarity in my research (Ellis, 2009; Tullis, 2013). Moreover, the concept of solidarity in my research extends beyond the solidarity among human beings to encompass the solidarity between human beings and the planet Earth.

I have attempted to explore solidarity between human beings and the planet Earth by challenging the narrowly conceived notion that non-human beings and nature are objects to be manipulated to satisfy human material greed (Shiva, 2005). In this context, Taylor and Taylor (2019) argued that we have witnessed the biocultural losses and climate changes, which are the footprints of the unethical and unsustainable development model of the West in the last 200 years, that do not consider the interdependence and coexistence of human beings and the rest of the planetary earth. It signifies that solidarity is a complex, ethically responsive relational praxis of care and empathy, involving collective emotion and mutual recognition, and may cultivate spiritual passions that further foster a non-violent, empathetic attitude towards others and the planet.

At this juncture of my inquiry, I have realized that the above-stated quality standards of pedagogical thoughtfulness, critical reflectivity, trustworthiness, crystallization, verisimilitude, and solidarity support addressing the most challenging issues of qualitative research, representation and praxis. Pedagogical thoughtfulness offers readers enough space to engage with texts that encourage them to examine and reflect on their pedagogical practices (van Manen, 1990) through critical reflexivity (Taylor, 2014), which helps represent and support them in rethinking their practices, a form of praxis. Likewise, the quality standards of trustworthiness and crystallization offer nuances and non-reflective texts transparently through thick descriptions (Guba & Lincoln, 1989; Taylor, 2014; Taylor & Medina, 2011) that further offer the spaces to the readers to compare, contrast, and rethink for a viable plan for the improvement, truly representing the quality of the research. Last, but not least, the verisimilitude and

solidary standards underpin the research help to make it more believable, lifelike and truthful (Taylor, 2014) by offering the ways of developing the empathetical vision, collective well-being and healing (Ellis, 2009; Tullis, 2013) and supports for creating the solidarity not only among human beings but also human beings, other living creatures and rest of the natural world that enrich the ethical and representational aspects of research.

Ethical Considerations

A discourse on ethical considerations in academic research is essential to ensure adherence to quality standards and make research acceptable and worthy in academia and the research community. I used postcolonial auto/ethnography as my research method, in which I am a significant source of exploration. There is a risk of self-indulgence and narcissism, which confines interpretation and meaning-making within a highly personal frame of reference (Sparkes, 2000). In my opinion, using oneself as a subject of exploration is not a problem, but how the self is interpreted is crucial in auto/ethnographic research. I have addressed these ethical issues by engaging in critical self-reflection, employing multiple logics, and interpreting the text through connections to the lived experiences of my research participants. Likewise, I acknowledge the personal, social, institutional, and academic values and norms, and I never disclose the individual and institutional identities of my research participants (Udo-Akang, 2013). The names of my research participants and their host institutions are pseudonyms. Moreover, I have described the aims of my research and its benefits at both institutional and individual levels, and obtained their consent before exploring the field text (Griffin & Griffin, 2019). I have also adhered to the university's ethical guidelines, rules, and regulations. I have acknowledged, recognized, and respected all perspectives, voices, and values and used unbiased language. I have focused on the overall well-being of research participants, institutions, human beings, and the planet Earth. I am always mindful of respecting the rights of my research participants, ensuring inclusivity, and aware of research integrity (Carpenter, 2018), which helps instill values and believability in the research. In addition to these general ethical guidelines, as a postcolonial auto/ethnographic researcher, I have considered the following ethical standpoints to enrich the collective inclusive values that contribute to social transformation.

Ethics of Empathy[8]

As a postcolonial auto/ethnographic researcher, I am aware of a postcolonial stance that focuses on assessing the colonial remnants entrenched in ME, and how they inform current practices that need to be dismantled to envision an inclusive ME. In doing so, I adopted emphatic attributes. The emphatic attributes in educational research provide platforms for creating meaningful learning experiences that allow the researcher, research participants, and readers to find meaning for themselves and within their relationships that are quite different from instrumental learning mechanism that takes learners as means to ends (McGrath, 2014, as cited in Radziwill et al., 2015).

An empathetic relation provides the epistemological and ontological underpinnings in postcolonial auto/ethnographic research. It comprises a notion of coming to know oneself and others, an indispensable and inseparable relationship that mutually constructs their worlds and meanings. In this context, Pensoneau-Conway (2012) highlighted a significant empathic connection between self and others " 'I' am never just 'I,' but I am 'I' because I am in a relationship with 'you,' creating 'we.' Likewise, 'we' are never just 'we,' because we are situated in a larger social… context" (p. 35). Such a dialectical relationship may enhance the praxis of social justice and inclusiveness. Without holding empathetic regard for others, it seems difficult to infuse the notion of praxis into the context of doing postcolonial auto/ethnographic research: becoming (self), relating (with relational others), and creating an inclusive community (together). The empathetic relationship promotes agency, enabling individuals to develop genuine altruistic concern or care for others (Slote, 2007), thereby reviving their identity, culture, and intellectual traditions. Likewise, empathetic relations do not imply the notion of the superiority of one ideology, worldview, or way of knowing over others, thereby fostering a culture of mutual respect, equity, social justice, and inclusivity.

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Ethics of Inclusiveness[9]

The metaphor of inclusiveness is often mistakenly taken as a rhetorical device that describes only the physical involvement of marginalized groups as research participants. The researcher appears to be unable to acknowledge participants' embodied knowledge systems and epistemic processes. Ignoring participants' values, perspectives, and their onto-epistemic practices is nothing but the product of the colonial amalgamation in the educational landscape (Smith, 2012; van Stam, 2017).

The researcher's colonial posture can take on missionary attitudes of superiority rather than cooperative and empathetic ones (Shields, 2018). A primary concern for inclusively inspired ethics is to recognize the lifeworlds of disenfranchised communities and people, thereby giving back to the communities from which the knowledge is taken, so that they become aware and conscious of the disempowering forces that contribute to the lag in their societies (Smith, 2012).

The major ethical stance of postcolonial auto/ethnography is to empower research participants and practitioners by recognizing their voices, perspectives, and ways of being, knowing, and doing; allowing them to speak for themselves and offering opportunities to participate in critical reflective practices, thereby developing critical consciousness. For example, a researcher can ask participants to portray their imaginative curriculum, pedagogy, and assessment, and then ask them to critically reflect on these constructs, considering what would happen if they were implemented. Such involvement in the research process may invite research participants to take ownership and authorship of the research outcomes, embodying the true essence of inclusiveness that helps obviate other threads of postcolonial auto/ethnography, such as narcissism and solipsism.

In addition, the ethics of inclusiveness in postcolonial auto/ethnography insist on overcoming the analytic bifurcation of attributes that lack a holistic meaning for the phenomenon. The ethical consideration of inclusiveness encourages me to address ontological and epistemic violence and injustice, a pressing issue for those affected, which is deeply intertwined with education in general and ME in particular. Epistemic

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injustice is the deep imprint of Western domination and hegemony, which adversely affects the ways of being, knowing, and doing of learners and researchers from GSTR (Bhargava, 2013; Paraskeva, 2016). Epistemic injustice is the process of colonizing minds and creating a colonial loop that makes it difficult to escape, as people learn to forget historical knowledge and the ways of knowing and living harmoniously, passed down from their ancestors (Go, 2015). In this context, I realized that the central ethical value for both the researcher and participants is to revive distorted or wounded history and reclaim lost identity, knowledge, and culture, among other things, through inclusive education and research programs.

Ethics of Healing[10]

The primary goal of postcolonial auto/ethnographic research is to transform the existing ME program, informed by the Western modern perspective, a secret weapon of cultural imperialism (Bishop, 1990), toward a more inclusive, empowering, and socially just one. More than that, many other fields such as history, economics, technology, education, culture, politics, and language, to name a few are affected by the colonial hubris (van Stam, 2017) that help create a metanarrative; Western is superior to others, thereby suppress the agenda of social justice, equity, inclusiveness, mutual respects, and social transformation and thus establish the notion of social Darwinism as a natural phenomenon. It is the most powerful trick of Western hegemonic ideology that renders social injustice, oppression, asymmetric power distribution, loss of biocultural diversity, inequitable economic structures, etc., as natural outcomes, making them not readily discernible and hence not easily corrigible. In this regard, as a postcolonial auto/ethnographic researcher, I could not be neutral and take a stance of resistance to exploring dehumanizing and de-ecological attributes by deploying inclusive logics and genres, aiming to develop critical consciousness among research participants, practitioners, readers, and researchers so that they can deeply engage to revitalize their history, culture, identity and ecological sustainability through inclusive educational praxis termed as an ethic of healing.

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The metaphor of healing comprises an ideological critique, recognition of otherwise neglected voices, identities, and values, developing a culture of mutual respect, preserving the environment, and empowering the research participants by encouraging them to deeply engage in a dialogical process without feeling any domination and/or superiority through storytelling, narration, poetry, and metaphors. These multidimensional ways of exploration provide enough space for my research participants and me to ventilate our lifeworld experiences. It might work as a healing process because it makes our voices, perspectives, and lifeworlds more recognizable.

I think postcolonial auto/ethnographic research is a learning and a healing process in which the practitioners get insight into the inner world for exploring the outer world so that they become change agents, thereby orientate in re/curing the distorted history, reviving the loss identity, revitalizing the lives of the marginalized people, recognizing voices, valuing cultural ways of knowing and doing, developing a culture of respects. Gullion and Tilton (2020) seem quite explicit on this point: the healing process will truly occur when culture is not filtered through Western ways of knowing, allowing disenfranchised people to make wise decisions regarding their lifeworld. In this context, multi-paradigmatically informed postcolonial auto/ethnographic research design becomes a space for cultivating self and others by means of caring, healing, and agentic development (Qutoshi, 2015) to re/engage self and others for resisting systematic tyrannies imposed by neoliberal and/or colonial higher education culture (Morgan, 2021). From this discourse, I realized that when people find recognition and valuation of their cultures, histories, identities, and ways of knowing, they enjoy the beauty of inclusivity, which can bring new vitality to their lives.

Chapter Summary

In this chapter, I have outlined a methodological approach to navigate my inquiry. In this research, I have conceived of multiple realities in the process of relational becoming, shaped primarily by the power dynamics of contemporary society, nation, and the world. I have honored the epistemic pluralisms to uncover these multiple realities. This philosophical position provides enough space for my research participants and myself to express our lived experiences through various means—narratives, poetic, metaphorical, dialectical, and non-textual genres. I have embraced the multiparadigmatic design space to explore the complexity of ME. I employed a critical paradigm to examine the power dynamics and their positive and

adverse effects on ME. An interpretive paradigm enables me to explore issues grounded in the research context. Likewise, postmodernism encourages exploring and representing the issues in multiple ways, and integralism helps achieve holistic meaning by integrating diverse views, perspectives, and onto-epistemic practices.

Moreover, I have employed postcolonial auto/ethnography as a research method, recognizing its power to unearth colonial remnants, its dialectical space for creating mindful and lively discourse, and its capacity to foster transformative praxis. In so doing, I have employed writing as a process of inquiry to create layered texts through continuous dialogue with my five research participants, through their narratives and voices, my lived experience, and critical reflection on ME as an active insider practitioner. I have utilized a set of standards—pedagogical thoughtfulness, critical reflexivity, trustworthiness, crystallization, verisimilitude, and solidarity to address issues arising from the multiparadigmatic spaces—criticalism, interpretivism, postmodernism, and integralism. I have embraced the ethic of empathy that connects the self and others. Similarly, the ethic of inclusivity is addressed differently by incorporating otherwise neglected voices, onto-epistemic practices, scholarship, and ways of doing and living. Finally, I have adapted the ethic of healing to create discourse for healing the wounded humanities, reviving biocultural diversities, addressing ecological devastation, and preventing the sixth extinction, thereby creating a peaceful, socially just, and sustainable future.

CHAPTER IV
EXPLORING COLONIAL LEGACY IN MATHEMATICS CURRICULUM

I have approximately four decades of experience in ME in Nepal as a student, teacher educator, and practitioner-researcher. I have encountered numerous turmoils that have positively and/or negatively affected my academic and professional lives. When I critically reviewed my journey, I found many unanswered questions that the ME authorities silently ignored. Likewise, I neglected many of my students' queries. At that time, I perceived such events as natural phenomena in the educational milieu. I grew up in an academic environment at school and university, where doing mathematics meant completing the textbook problems and preparing for the final examination. More precisely, we were implicitly taught, and still have, that raising questions beyond daily lesson plans and out-of-textbook contents was an unethical practice within educational institutions, particularly in a mathematics classroom.

We teachers (including me) do not have the opportunity to perform freely in the classroom because we are already constrained by a rigid, content-overloaded, and decontextualized curriculum (Luitel, 2009). The teacher's primary duties were, and still are, completing the prescribed courses within the stipulated timeframe to prepare the children for the upcoming examinations. Teachers are simply doing file duties and menial work. Teacher and student voices and queries are overlooked, and students are urged to perform robotically. An esoteric and externally imposed curriculum instrumentalizes teachers and students. The consequence is that mathematical activities seem like a lifeless replica of abstract mathematics.

Experiencing a Dead Map of Curriculum

In this section, I use the metaphor of a dead map to describe a decontextualized, prescriptive curriculum that urges students and teachers to perform in a highly controlled, and externally imposed environment. Teachers and students are not allowed to bring their perspectives and social, cultural, and historical knowledge into the mathematics classroom. This knowledge is deemed primitive and non-standard. But I have experienced that without a sense of place, context, and understanding of local cosmological knowledge and ways of knowing and doing, a journey of ME looks like a journey through a dark tunnel, which I have captured as the metaphor of a dead map.

It was any day in June last week of 2020; I was sitting in a chair in the mathematics and science department just after finishing my class. One of my colleagues, Sagar, a mathematics educator who has been teaching bachelor's and master's degrees for one and a half decades, entered the room. *He said, Basanta sir, you have recently completed your MPhil and have started your PhD in ME. I have some queries for you. Do you have time for a while? I replied, yes, it is my leisure period.*

Sagar: *Nowadays, I am disappointed in the teaching profession. Students are found to be disengaged in teaching and learning activities. They always complain that they cannot relate mathematics to daily-life problems. Why do we need such highly abstract mathematical knowledge (indicating Abstract Algebra, Differential Geometry, Topology, even in higher order derivatives, Differential equations, etc.)? Is mathematics only concerned with seeking new mathematical knowledge and its teaching? Which chapters and questions are most important for upcoming terminal/final examinations? Is it allowed for us to write in Nepali during the final examination? These are some of the tedious questions I have faced in most of the mathematics classes.*

Me: *These are very challenging and philosophical questions frequently raised by students. I had such a feeling when I was a student at the bachelor's and master's levels. Teachers did not entertain such questions. They focused on solving and proving the bookish questions and theorems. What are your responses to these questions?*

Sagar: *I try to convince them that mathematics is a universal and highly rigorous subject. It is highly structured and logical. It has its own symbols, scientific logic, operations, procedures, and languages that make it universal. Its ability to capture and model natural phenomena more accurately and precisely opens the door to claiming it as universal. Mathematics is the queen of all sciences; without it, we can hardly imagine other social, scientific, and human disciplines. Its formalist structure provides a solid foundation that upholds its generalizability and universality. Moreover, another salient feature of mathematics is its rationality. It helps develop rational, scientific, and analytical thinking, which significantly contributes to the development of science, engineering, and information and communication technology (ICT). Finally, in the present 21st-century globalized era, it is essential to be a competitive human resource to secure a highly paid,*

prestigious job in the national and international job market, which might improve your life. Likewise, our mathematics curriculum has precise goals and objectives. These objectives seem easily obtainable without chaos because our curriculum clearly outlines instructional strategies and evaluation processes, and prescribes the necessary textbooks and reference books. If you follow these books, then you can easily obtain good marks in the exam. These are some of the arguments I put forward to convince my students; however, they do not seem to be satisfied.

Me: *I do agree with your arguments, in some ways. You have identified your problems, but* have *not given attention to the multidimensionality of ME. You have raised only one aspect of ME that un/knowingly supports the externally designed and executed curriculum practices. In my opinion, other forces implicitly/explicitly govern our ME. Do you have access to the curriculum design process as a university teacher? Who designs our curriculum, and whose interests dominate it?*

I have been teaching almost all the mathematics subjects at the Bachelor's and Master's levels (possibly you do so). I found them overloaded by the prespecified set of contents and oriented towards achieving narrowly conceived objectives and goals. I do not want to blame curriculum designers and experts. However, they seem imprisoned by the view that silos of isolated, discrete content ensure quality of ME. Teachers are apparently enslaved by the prespecified curriculum, which compels them to perform the required file duties. They have not been able to demonstrate their capability because of the narrowly conceived objectives, and have always been worried about finishing the course within the stipulated timeframe. When I got an opportunity to participate in a curriculum dissemination program, I raised these questions. But most of the time, the disseminators (professors from the university) said, the curriculum should be aligned with international standards and meet the demands of the present era of globalization. What is our destination without having standard goals and objectives? Do you think that our ME produces globally competent human resources? What does it mean by international standards? Who sets up the standards of mathematics? Why have other aspects of ME been ignored? I am really bemused when I contemplate the curriculum practices of ME in Nepal. Do you think these queries are significant and considerable during the curriculum formation process?

Sagar: *I do not fully convince from your arguments. How can we conduct teaching and learning activities without a pre-designed curriculum? It seems somehow an*

uneven, unrealistic, and idealistic view. After designing a curriculum with prespecified objectives, contents, instructional strategies, and evaluation procedures, the ME program can produce the desired outputs. If we don't have these roadmaps, what would ME practices be in Nepal? I conceive mathematics as a universal, rational, generalizable, precise, pure, and scientific discipline. Its fundamental structures, languages, symbols, operations, and algorithms underpin the basic foundation of mathematics. Challenging and obviating fundamental constructs of mathematics further erode its value and may foster a negative attitude towards mathematics. In my opinion, it would be a suicidal attempt to question its universality, generality, rigor, and rationality because these attributes glorify the values and importance of mathematics. However, we are unable to illuminate the value of mathematics and its significant roles in scientific development and in other social and scientific disciplines. Despite this discontent, I agree with your arguments that the mathematics curricula in universities and schools seem disconnected, isolated, and content-heavy. It fails to connect classroom mathematics with real-world problems.

Me: Yes, I have already mentioned that the vast array of content prevents teachers and students from deeply engaging in teaching and learning activities. Teachers (including myself) always rush to complete the content and cannot focus on enhancing conceptual and relational understanding and their implications in different disciplines and real-world problems. Teaching-learning activities seem to focus on preparing the students for the upcoming examination. Our ME system molds our minds and ways of thinking, leading us to believe that attaining a school and university education is only for receiving a certificate. It gradually erodes the learning environment in an academic institution and fosters undesirable, unethical behavior during the examination period, thereby promoting a culture of blaming.

*Likewise, teachers are not allowed to work independently because of the rigid curriculum and examination system. They are already bonding to commit according to the prespecified goals and objectives. Nowadays, I feel that teaching-learning activities in ME seem like '**Adhyaro Surung ko Yatra**' (A journey through a dark tunnel), where most things are invisible. Students and teachers are compelled to reach the final destination as soon as possible. They are not only restricted to enjoying the scenery's virtues and beauty, but these features have also been seen as obstacles to reaching the destination within the stipulated time. The*

narrow view of curriculum as a given blueprint incorporates highly technical, rational, and bureaucratic thoughts that detach mathematics from real-world problems. It recognizes learners as passive receivers of knowledge rather than active participants and creators.

Sagar: *I cannot negate your arguments; however, I am not fully satisfied with your logic. My major concerns are your avoidance of universality and generalizability, the scientific and rational logic of mathematics, and your ignorance of prespecified objectives and predesigned curriculum, as I mentioned earlier. In my opinion, we need to address students' concerns. They are seeking readymade learning materials and a list of possible questions that are more likely to appear in the final examination, so they can easily obtain good marks (grades). Similarly, they want to write the final examination in Nepali. But you favour the more flexible curriculum, in which teachers and students are free to choose their learning tasks and evaluation methods. How can we maintain national and international standards in ME in this situation? It creates havoc in an educational institution, making it difficult to maintain uniformity as a quality indicator. The flexible, open, and local curriculum might have reduced competition among the students, adversely affecting the quality of ME. How can we enhance the quality of ME without competition? It seems like a laissez-faire system in which neither government nor university authority is responsible. I do not know whether my visions can resolve the present crisis of students' disengagement in learning mathematics. However, if I were the concerned authority, I would reduce the content and focus on connecting classroom mathematics to real-life problems.*

Me: *I don't want to avoid your arguments. But these improvement tools, as you suggested, have not brought about a viable change in ME. The concerned authority has made such attempts to address the problems many times; however, the situation has not improved. These attempts seem superficial and fail to explore the root causes of the issues, leaving them unresolved. It indicates that we need paradigm shifts in thinking and practice in ME to achieve the desired outcomes. Meanwhile, a bell rang.*

Sagar: *Thank you, Basanta sir, for your insightful arguments.*

Me: *You are welcome.*

After this conversation, I feel that our ME is guided by narrowly conceived views of curriculum as an end in itself. It is supposed to be achieved after certification

by the institution based on so-called pass marks (grades). It relegates the other skills, concepts, and knowledge necessary for informed citizenship. My true feelings, perceptions, and reflections on this conversation are captured under the following verse.

I wonder,
Where the curriculum was born
And where it resides now
Who the hell nurtures and underpins it?
Why does it stay away distinctly,
Scaring others so dreadfully?

I wonder,
How does it gain access to school premises?
Acting as a master, making others work like slaves
We are constantly bound to revolve around it
Despite its strictness, we adhere to it fearfully.

So strange are its attires, guises, and customs
Foreign myths superimposed on our voices
Our prior experiences and knowledge are doomed
How are the knowledge and skills obtained
When the curriculum is distorted as such?

All rely on it for knowledge and skills
Yet tend to flinch back
When faced with real problems.
Neither does it harmonize life with the world
Nor create a new avenue
But renders everything into bookish knowledge.

I wonder,
Who the sole authority is?
And who is responsible?
Does it ignite creative thinking?
Why do we need to learn?
Bemused, I fall into the sea of dilemma.

The above unstructured and emergent conversation reveals many unexplored and/or untold features of ME practices in Nepal. I have observed vast contradictions

between students' convictions and aspirations and the teacher's understanding of mathematics. Students complain that the ME curriculum has not addressed real-world problems. They fail to connect classroom mathematics with their lives. In their opinion, almost all of the content included in the curricula seems strange, abstract, rigid, context-free, and ultrarational. However, un/knowingly, teachers strongly prefer these attributes as the ultimate features of modern mathematics, and worry about students' disengagement in learning. In this connection, researchers (Babaci-Wilhite, 2019; Kanu, 2005; Tarc, 2018; van Stam, 2017) have argued that education in many tricontinental regions (Asia, Africa, and South America) is unable to foster critical and creative thinking because education systems of the regions fail to connect their soil, language, culture, history, and ecology. These attributes are masked in the name of providing modern mathematics.

Modern mathematics, which has gradually established its presence at the school, college, and university levels in Nepal after the establishment of Durbar School in 1853, Tri-Chandra College in 1918, and Tribhuvan University (TU) in 1959, respectively (Shrestha, 2008). It had also been endorsed by the Nepal National Educational Planning Commission (NNEPC,1956) led by the US-based scholar Dr. Hugh B. Wood. It was a more viable starting point for foreign invasion in the formal educational planning and policy of Nepal that devalued our educational experiences (Lamichhane & Luitel, 2023a). The overall manifestation of the NNEPC is that Nepal is an 'oriental world' (Said, 1978), and it highlights the urgent need to induce occidental forces to transform existing practices into so-called modern ones (Regmi, 2021b).

Despite the lack of apparent positive effects, the government of Nepal is willing to strengthen modern education. Nepal has sent some scholars and educators to the USA for training to build a pool of trained and skilled human resources in education. The US-trained scholars took the reins of the Nepali education system and began training teacher educators, policymakers, administrators, and curriculum designers. They also hold senior positions in government offices and universities and transmit imported, uncritical, and conformist knowledge through teacher education and training programs (Regmi, 2021b). By following the imported knowledge and ways of knowing without due respect to the local, indigenous, and historical knowledge and ways of knowing, mathematics educators not only forget to tell juniors that we have a rich diversity in mathematical practices but also intrude on them to

condemn our ME practices by favoring the so-called Western Eurocentric mathematics (Lamichhane & Luitel, 2023a; Shrestha, 2008). The influence is that most of the mathematics, but not all, that was taught and is still being taught in Nepal is far from the lifeworld of the Nepali learners (Lamichhane, 2021), which supports materializing mathematical Othering (Abtahi et al., 2020) in which students get very little or no relevance of classroom mathematics with their immediate environment.

The primary deficit of modern education in general and so-called modern mathematics in particular is its ignorance of the other knowledge and ways of knowing that have been developed around the tricontinental region (Bhambra, 2007; Bishop, 1990; Ernest, 2016a; Go, 2013; Quijano, 2007; Takayama et al., 2017). It is a hidden weapon of imperialism (Bishop, 1990), which not only celebrates the narrowly conceived reality, ways of knowing and its values but also indoctrinates their ideology, culture, and values (Mchombo, 2019) through trade, transportation, information communication, and technology and scientific innovation in the medical sectors (Ernest, 2016a). Undoubtedly, mathematics can describe, interpret, and communicate natural and social phenomena more efficiently and precisely (Goodwin et al., 2014) than other disciplines; however, it is not absolute, universal, and immutable.

In our context, educational institutions become places where externally sanctioned knowledge, skills, and concepts are transmitted without considering their long-term effects, with the ambition of transforming Nepali society into a modern one. It gradually detaches from the soil, cultural and historical practices that possibly prevent creative and critical discourse in education, and lead us to adopt the foreign decontextualized mathematics (Luitel, 2009). It develops an unconscious, uncritical mindset among practitioners, leaving them unaware of the devastating and catastrophic effects (Freire, 2005) not only in the education sector but also in the nation's social, cultural, and political spheres. I found that the modern curriculum has been informed by a technical interest (Habermas, 1972), which incorporates the hidden notions of control, management, and exploitation.

The technical interest concerns the curriculum as a given entity that celebrates only hypothetico-deductive reasoning, monolingual communication, objective knowledge, and neutral values (Grundy, 1987), which, in turn, informs pedagogical practices (Lamichhane, 2017). Teachers and students have been unable to engage in profound discourses to challenge and deconstruct its colonial wakes because the mainstream group holds the power to control the immediate environment. It could

gradually create space for social exclusion, which again supports the establishment of hidden colonial power in policy and managerial sectors of education (Regmi, 2021b; Silova et al., 2020) that implicitly controls the environment for the benefit of elite people who have access to the power centers (Habermas, 1972; Slattery, 2006).

Learners who come from rich biocultural, social, historical, and linguistic backgrounds and possess native knowledge, skills, and concepts are not recognized by modern education. They feel an inferiority complex and begin to take mathematics as a foreign body of knowledge: isolated, disconnected, and lifeless (Luitel 2013). Moreover, those who favor the so-called modern mathematics argue that if these attributes become the content of curricula and classroom discussions, it will result in institutional, social, and political dysfunction, which in turn, will lead to social, political, and economic anarchy. What type of education system have we adopted in which the incorporation of local knowledge, skills, and ways of knowing is prohibited? Our ME has adopted a bureaucratic and Tylerian approach to curriculum development that regards the curriculum as a fixed, secure running track on which everything is already channeling and treats all other factors, forces, and scenarios encountered along the journey as major obstacles (Yu, 2009). Teachers and students are compelled to follow predesigned routes and tracks without questioning, using arbitrary power and authority (Bourdieu & Passeron, 1990) that asphyxiate learners, a phenomenon I have captured through the metaphor of a dead map (Yu, 2009).

In a dead curriculum map, teachers and students are dominated by externally imposed objectives and content. They are centered on textbooks for test preparation because they are not allowed to go beyond the prescribed content. The impact is that they are unwilling and/or unable to explore the interdependence and interconnectedness of mathematics with other disciplines and lifeworld problems (Yu, 2009). The product-oriented curriculum seems to focus on predictable outcomes, efficiency, and competition rather than on incorporating emerging situations and the complexity of the environment (Baptist, 2002). In such a closed system, teachers and students tend to follow procedures set by external authorities, thereby eroding creative, innovative, critical, and imaginative thinking and inquiry.

The restriction of critical, imaginative, and creative thinking and inquiry undoubtedly promotes the reproduction theory of education (Bourdieu & Passeron, 1990) in which learners are regarded as incognizant, unaesthetic, non-sensible, and non-affective beings unable to understand ambiguity and uncertainty (Apple, 2019). It

develops a machine aesthetics of modernism (Jencks, 1996), in which learners' sociocultural, historical, linguistic, and ethnic backgrounds, as well as their spiritual sensibilities, are not only ignored but also regarded as significant hindrances to the fast-track journey of education. It contradicts the historical view of the development of mathematics as a community of practice, in which learners are involved in the learning process through interactions, communication, sharing, and livelihood activities over time, thereby making meaning from their experiences, which seems a more viable learning strategy (Lerman, 2000). It allows the learners to understand the interconnectedness and interdependences among different values, cultures, ideologies, and power dynamics in society, institutions, and nations. Understanding and acknowledging these forces in developing mathematics curricula provides learners with insight into challenging a universal foundation and objectivity in mathematical knowledge (Stinson et al., 2012). To challenge the existing universalist approaches means not rejecting them but creatively engaging to seek alternative practices.

In this stage of inquiry, I have conceived that excluding the learners' social, cultural, historical, and lingual backgrounds, the curriculum becomes a dead map, in which we find the implicit imposition of the power and dominant ideology merely oriented to distort the nature and natural ways of knowing (Baptist, 2002). In this connection, Freire (2005) articulates that it is the most dehumanizing process imposed on the oppressed groups and urges them to internalize oppressors' values, perspectives, and ways of knowing as natural and neutral entities without questioning.

From the above discourse, I have come to understand that, through the prolonged implementation of the modern curriculum in schools and universities, teachers and students are captivated in such a way that they rarely solve unconventional problems, as they are obsessed with goals and persuaded by non-transformative mindsets. They could not explore the oppressive forces enacted through the dead map of curriculum, indeed becoming conditioned and unknowingly acknowledging a disempowering and exclusive system. Students and teachers are restricted from engaging in free and pure discourse (Taylor & Williams, 1992), so they have a rare chance to challenge and respect other perspectives. It indicates that the mathematics curriculum seems to be a dead map, informed by Western Eurocentric thought and the perpetuation of colonial and imperial power (Bishop, 1990), yet concealed in the name of modern education (Lamichhane, 2021; Luitel & Taylor, 2010). It demands further exploration to unearth the detrimental effects of the colonial

remnants of a Western-Eurocentric-informed curriculum that hinder the path to transformative mathematics education in Nepal.

Unveiling an Exclusive View of Mathematical Reality

I have experienced that a fundamental problem in ME had started from curricular practices in schools and universities in which students were and still are taught to accept the single reality (truth) of mathematics. Elsewhere, mathematics educators and researchers (Ernest, 1998; Lamichhane & Belbase, 2017; Luitel & Taylor, 2010; Pant, 2015) contend that the very problems of ME have emerged from how mathematics teachers, teacher educators, and curriculum designers perceived mathematical reality. Their beliefs, attitudes, and perceptions of mathematical reality shape positive/negative images of mathematics, which are reflected in their classroom activities and are highly likely to be transmitted to youngsters (Howse, 2006; Lamichhane, 2017; Shahvarani & Savizi, 2007). The perceived nature of mathematical reality governs the ways of knowing, creating, and valuing mathematical knowledge (Ernest, 2008), as well as research activities (Willis, 2007). In this regard, I have some propelling questions: What is the nature of the existence of mathematical knowledge? Where does it reside? Does mathematical knowledge exist independently of the sociocultural and historical settings? Do these settings affect the ME curriculum?

Now, I turn my attention to how I have portrayed my values regarding mathematical reality throughout my academic journey, culminating in the completion of my Master's Degree in ME. The following poem illustrates how practitioners are confined within the terrain of pure mathematics, which conflates with an exclusive view of reality.

Dedicate to me every success,
Enjoy my melody without questions.
If you demure, it might lead to darkness,
Serve me without doubt, to illuminate your future.

Entire goals and aspirations are set up for you,
Follow them without hesitation and skepticism.
Don't be confused, standing at the juncture,
Follow the recommended route to reach the station quickly.

Your pals have already reached the goal,
Why take a risk in excavating a new road?
The cliffs might fall over your head,

You might fall into the canyon
Your dreams and life might be swept.

Should learn to saunter,
Along with my melody and rhythm.
Don't get into turmoil,
Don't be fed up with my company.
Accumulate and deposit me in your brain,
Need for disseminating to newcomers
I'm God's offering.

The above poetic expressions critically reflect the mathematical reality I perceived during my academic journey. These views of mathematical reality are not solely my mental constructs. The mental images of mathematics depend on prior experiences and achievements, peer groups, mathematics teachers, and parents' influences, classroom pedagogical approaches, individual beliefs, attitudes, and anxiety toward mathematics (Lane et al., 2014). I can't make any claim regarding the mathematical perspectives held by teachers, professors, curriculum designers, and other concerned authorities. However, my perception of mathematical reality is shaped by our curricular practices from school to university.

From the very beginning of my primary-level education, I encountered the classroom culture of mathematics, in which numbers are presented as an abstract entity, seemingly independent and invariant, with properties that can be conserved. It gives the impression of mathematical certainty, objectivity, and universality (Ernest, 2016b). Over time, the absolutist view of mathematical reality led me to develop a habit of mind that treated everything as objectively measurable, linear, and functionally expressible. The universal mathematical realities are the building blocks for the rest of mathematical knowledge, concepts, and theories. It enriches a concept of mathematics as an end product and prevents thinking of mathematics as-in-the-making (Jankvist, 2009).

In this regard, one of my research participants, Surya (all names are pseudonyms), aggressively contends the authoritarian views of mathematics and its research. *When I was a doctoral student, I learned that the Nepal Academy of Science and Technology (NAST) issued a call for proposals for higher studies. I tried to submit my proposal on the classical mathematical practices of the Nepali community, but the authority refused to register it. I complained to the administrative chief and to the*

senior professors, and shared it with my colleagues. Most of them discourage me. You are a brilliant student of pure mathematics. Why do you select classical mathematics as your future subject? It has little or no meaning in the present context of the modern and global era.

*Basanta sir, what might be the region behind it? You can easily imagine that our authorities ignored the existence of local mathematics practices. They only celebrate the features of pure mathematics. I have observed a significant deficit in our school and university curricula. They focus only on official (formal) mathematics, ignoring our '**Sanatani Ganit**' (Mathematics developed in our cultures), as well as sciences, engineering, and the arts. Due to a lack of exploration, preservation, and dissemination, almost all of these are on the verge of extinction. Our rich mathematical, scientific, engineering, and artistic works can be seen in Dhunge Dhara, an archaeological temple (Kasthamandap, Krishna Mandir, Nyapotal Deval, Swayambhu, etc.), and royal palaces (Hanuman Dhoka, Shina Durbar, Pachapanna Jhyale Durbar, Rani Mahal, etc.) in the Kathmandu Valley and countryside. I think we are unaware of the alternative perspectives in mathematics that constrain the possibility of flourishing new avenues of mathematical discourse in schools and universities.*

In a similar vein, Chandra shared his experience. *I asked the university's authority why our university has not acknowledged the sociocultural, historical, local, and indigenous mathematical knowledge in formal ME programs of schools and universities. I was shocked and saddened to hear their reply. University is the place where students learn **Big Ideas**. They can learn such superficial things (indicating social, cultural, indigenous, and historical knowledge, skills, concepts, technologies, arts, science, engineering, etc.) on their own. In my opinion, everything is influenced by foreigners. Our mathematics, whether in university or school, is nothing but a replica or remnant of foreign practice. It detaches mathematics from its roots and leaves it an obscure and mysterious body of knowledge. I can't understand which invisible forces constrain our school and university curricular practices within conventional, unresponsive, decontextualized, and brutal views of modernism that celebrate a single, exclusive view of reality.*

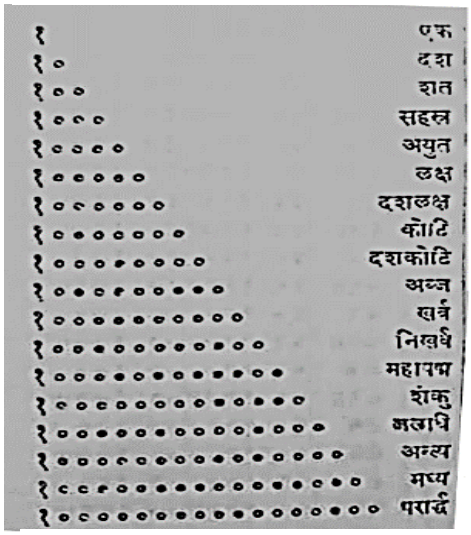
The discouragement of Nepali scholars from engaging in exploring mathematical practices in the Nepali context reflects the intentions of Nepali ME practices. Nepal is a multilingual, multiethnic, and multicultural nation. There are 124

different caste/ethnic groups and 142 lingual groups (NSO, 2023). However, there is a lack of rigorous exploration of the mathematical practices of these groups. It is one of the disgraceful phenomena that our university graduates remain ignorant of our historical mathematics practices (Lamichhane & Luitel, 2023a). This is because Nepali universities have not given priority to **'Sanatani Ganit'** in their research projects and curricula. I have one question: whether the different sociocultural/ethnic/religious groups do not have their own mathematical knowledge, skills, and practices, or whether our universities and concerned authorities are unwilling to explore these. Indeed, it is rarely possible to develop human cultures and civilization without having their mathematical knowledge, concepts, ideas, and practices. Bishop (1990) clearly stated that "all cultures have generated mathematical ideas, just as all cultures have generated language, religion, morals, customs and kinship systems" (p. 53).

Due to the over-reliance of our university on the Western Eurocentric conception of modern mathematics, ***'Sanatani Ganit'*** has almost been on the verge of extinction. Our counting system and symbols (Figure 8), measurement systems (Figure 9), and concept of mathematical ideas used in making daily used apparatus (Figure 4) have not been incorporated in formal mathematics curricula practices; however, these mathematical concepts, ideas, and techniques are still being used in a rural area of Nepal. As a mathematics educator and practitioner-researcher, I am an eyewitness to the fact that this mathematical knowledge, concepts, and procedures have been accused of being conventional, unproductive, and inconsistent.

Figure 8

Counting System of Nepal



(Sing, 1901, p. 16)

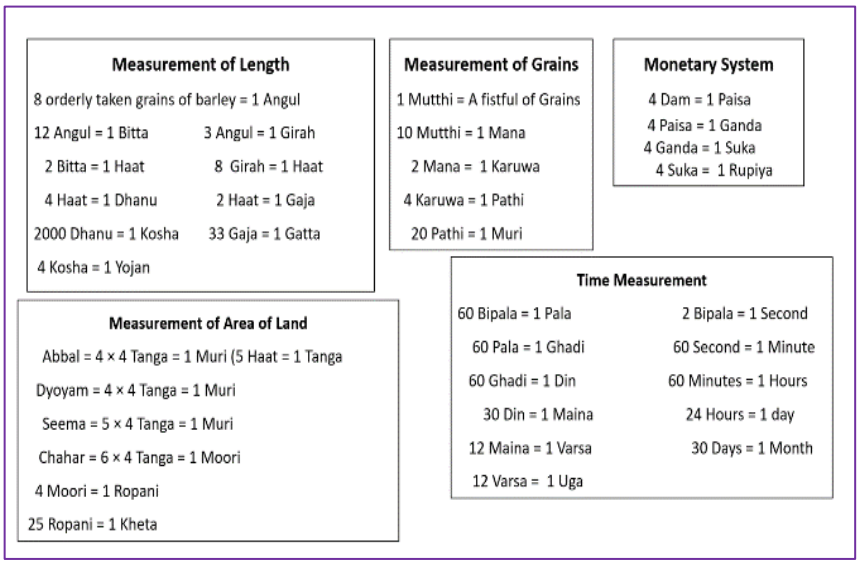
Likewise, Chandra's expression is *that the so-called modern mathematics education is nothing but simply a carryover of foreign mathematics,* revealing the dependency of Nepali ME practices on Western-Eurocentric mathematics. Elsewhere, I have expressed my opinion that one of the significant problems of Nepali ME is the uncritical adoption of foreign mathematics, which devalues the mathematical realities

evolved through the long historical, sociocultural, and lifeworld experiences of the people (Lamichhane, 2022, 2021, 2020).

Describing the adverse effects of Western-Eurocentric thinking in education, Santos (2007) denounces it as 'abyssal thinking' comprising visible and invisible systems. The invisible system is a building block of the visible one. The invisible system plays a significant role in categorizing concepts, ideas, thoughts, and technology into two mutually exclusive realms: ours and others. The visible system artistically disguises the invisible side. The result is that other realities, perspectives, epistemologies, and even the existence of othered cultures, civilizations, history, etc., have not been endorsed. It signifies that Western modern 'abyssal' thinking establishes the notion of the non-existence of other realities. It means that there are no other considerable or comprehensible ways of being and knowing (Santos, 2007). I have realized that the authority's views of **'Big Ideas'** could have resulted from Western Eurocentric thought. Underpinning this view, Held (2019) writes that modern academia has been governed by the Western modern paradigm, which intensifies ontological oppression; as a result, a culture of silence is purported.

Figure 9

Measurement System of Nepal



(Sing, 1901, pp. 10-17)

The culture of silence further prepares the ground for the export of Western Eurocentric thought around the globe, along with imperialistic and colonial attitudes (Thambinathan & Kinsella, 2021). A consequence is that the social, cultural, historical, and experiential realities that emerge from diverse ethnic or cultural groups in Nepal remain exclusive in ME (Lamichhane & Luitel, 2023a). It becomes a

powerful tool of acculturation, urging students to accept another culture's code of conduct, values, and ideology.

Schools become centers of acculturation where students from different cultures (cultures of tricontinental regions, ethnic minority groups, economically backward societies, linguistically diverse and neglected minorities) have felt difficulty in learning because social, cultural, historical, and lingual contexts in which students live define and shape their cognitive and affective development (Malloy & Malloy, 1998). At this stage of inquiry, I realize that the conceptions of exclusive view of mathematical realities, which are celebrated by modern schools and universities invisibly prepare a large group of school and university graduates so that they can work as agents not only for perpetuating the Western-Eurocentric views (Luitel, 2009) but also adversely influence the youngsters to condemn local cosmological knowledge systems and ways of knowing (van Stam, 2017). This discourse ignites the idea that ontological exclusion is fertile ground for disguising colonial legacy and its adverse effects on multi-epistemic practices.

Unearthing Naturalization and Neutralization of Epistemicide

When I was in grade IX, there was a provision for morning classes during the summer season (generally May, June, and July). The temperature of this season varies from 30 to 40 degrees Celsius. There was no electricity supply in our village. Near my house, there was a garden covering approximately 7 hectares. After lunch, people gathered in the garden to get relief from the extreme warmth. They used this period to share their lived experiences.

They shared, discussed, and tried to come up with a common understanding regarding their professional experiences and expertise, such as husbandry, fishery, beekeeping, farming: appropriate time of preparing a nursery for different crops, the timing of fertilizing and quantity of fertilizer to be used for particular types of crops, ways of preparing organic or bio fertilizer, and planting, caring, harvesting and preserving crops. They gave examples and counter-examples based on their lived experiences. They compared the previous production level with the current one to identify possible factors that positively or negatively affect production level and its quality. They used this information for planning the next sessional crops. Likewise, they discussed scriptures such as the *Mahabharata, the Ramayana, and the Bhagavad Gita*, and shared their ancestors' knowledge, skills, and lifestyles. They also seemed sensitive towards the gradual loss of our sociocultural and historical heritages,

artifacts, and ways of knowing. Un/knowingly, they expressed dissatisfaction with the role schools play in preserving and protecting our sociocultural and historical capital. They seemed worried because their youngsters had become unaware of these capitals and had ignored and condemned them. We (my colleagues and I) carefully listened and tried to understand our ancestors' knowledge, concepts, and ways of learning; however, we did not make sense and remained unresponsive. Indicating our unresponsive presence, they (senior people) said, *Padheko Manchhe Napadheko Kura Bujhadainu Hola* (meaning that we can understand only those facts and concepts read in schools' textbooks and ignore the rest).

During this discussion, one of the senior and respected persons we called 'Thulo Buwa' persistently argues for enriching and preserving the cultural ways of knowing. He was disappointed by the disconnected ways of learning in Nepali schools. He said ***Angrejii Shiksha*** *(indicating the modern education system in Nepal) failed to contribute to the overall development of learners and the nation because it was not grounded in Nepali soil, ecology, culture, and religion.*

Immediately, he asked us three questions (my friend and I; we were both in grade IX). Seven birds were in a tree; a bird hunter shot and killed two birds. How many birds were there in a tree? We laughed loudly and quickly replied that there were five birds in the tree. He did not acknowledge our answer. We repeatedly argued for the same solution. Thulo Buwa did not immediately explain or solve the problem. He again asked us another question. A pit having dimensions of 5m long, 4 m wide, and 6 m deep, how much volume of soil is in the pit? I reply that it is the most straightforward question for me. I have the formula to find a volume. The volume of soil in the pit is 120 m^3*. He teased us. He added that before starting formal education, he had learned such unconventional mathematical thinking, reasoning, and techniques for solving nonroutine problems from his grandfather. We continuously argued that, if our solutions were incorrect, they did not constitute mathematical problems. Mathematical rules and formulae could or should not give a wrong solution.*

Finally, Thulo Buwa gave us a Nepali calendar and asked us to determine the time of sunrise and sunset the next day. We were speechless because we lacked the knowledge and skills to read and understand the meanings of the symbols and statements in the Nepali calendar. We apologized and requested to solve the given questions. Indicating our ways of thinking and solving mathematical problems, Thulo Buwa stated that current teaching and learning in schools focus only on a standard

form of knowledge, which is rated and sanctioned by the authorities. Being habituated to standard rules-based learning, our students can solve only bookish or routine problems and fail to connect mathematical ideas and concepts with their lifeworlds. You have been taught by the standard rules and procedures that could erase out-of-the-box thinking, reasoning, and knowing. Such learning strategies restrain the learners within the four walls of the classroom.

The above narrative indicates the existence of other ways of knowing that are pervasive in our sociocultural and historical context, which are beyond the narrowly conceived boundaries of scientific knowing and logic. I understood that our ancestors used unconventional logics, such as metaphorical, poetic, imaginative, and narrative reasoning, to name a few, and different forms of thinking (Saldana, 2015) to address emerging realworld problems. However, we have not been aware of the possibility of alternative reasoning, and have relied solely on analytical reasoning and hypothetico-deductive methods. I have explored that our historical learning featured the *Pratyaksha Pramana* (sense perception and experiential learning), *Anuman*a (inference, based on past experiences and immediate evidence), *Shabda* (testimony, authority, the Hindu scriptures), *Upamana* (analogy, comparing and contrasting) (Koirala et al., 2021; Lamichhane & Luitel, 2023a; Reagan, 2018).

During the discussion, our villagers shared their knowledge, concepts, and skills constructed through direct engagement (*Pratyaksha)* in their respective professions and livelihood activities. More interestingly, they could estimate the timing of rainfall, the planting and harvesting periods for crops, the possible timing of crop infectious diseases in crops, and ways to protect crops. These are excellent examples of inference practices that emerged from their lifeworld experiences. Likewise, I found that they used different forms of *Upaman*a to make meaning more elucidatory and enrich understanding; for instance, they provided examples of demons/monsters to illustrate an evil spirit and sages to exemplify admirable characters and sources of wisdom.

Another silent feature I observed during the debate was that each participant expressed their opinions on particular issues, but there were no contestants. Each supported and encouraged the other to arrive at a consensual understanding. It is an example of honest debate and ways of learning, as seen in Shravana and Manan. The honest debate is one of the most significant ways of learning in the Hindu tradition. It seems to have originated in the discussion between *Bhagavan Krishna and Arjun*, in

which *Bhagavan Krishna* made *Arjun* understand his duties and responsibilities as a *Kshatriya* when *Arjun* refused to participate in a war against their siblings, family members, kin, and gurus (Krishnakripamaya, 1997; Paudel, 2023). This event helps me understand that debate is not about defeating others, but about helping people understand their rights, duties, and responsibilities, so they can seek the truth peacefully and establish the right views. It further supports living peaceful and delightful lives, one of the most challenging problems of the 21st-century, super-colonial era (van Stam, 2017).

I have rarely found enough evidence that the aforementioned rich ways of knowing have been acknowledged. In a similar vein, my research participant also articulates their experiences regarding the ways of knowing perpetuated in our schools and universities.

One of my research participants, Bishnu, articulates his experience. *Given the possibility of constructing mathematical knowledge that connects with our ground realities, we do not focus on the knowledge-construction process. We have started teaching mathematical concepts by drawing on ideas from Greek, Egyptian, and Babylonian civilizations, among others. I do not mean that bringing these ideas into the mathematics classroom is unnecessary, but my concern is why our own is excluded. For example, we can engage our students in cultural practices to explore the mathematical concepts embedded in those cultures. For instance, we can involve students in the process of constructing the '**Rath**' for **Indra Jatra** and **Machhindranath Jatra** (suggesting me to insert the figures), and in how these concepts have emerged in cultural practices. In this process, students can learn mathematical concepts such as the components of a circle (diameter, radius, sector, circumference, etc.), slope, angle, parallel and perpendicular lines, squares, rectangles, and even the pyramidal shape, among others, along with their sociocultural values. However, these constructs have not been considerably acknowledged in ME and its research. It is one of the symbols of ignorance and devaluation of sociocultural and historical ways of knowing.*

Likewise, Durga ventilated her lived experiences during our conversation. *After the establishment of Durbar High School, Nepali ME is oriented to deliver mathematical concepts, ideas, and theories as 'taken-for-granted knowledge'. Teachers and students begin to enjoy the peripheral reform of the ME curriculum and its associated pedagogy and assessment systems, which hinder the development of*

critical consciousness, creativity, and innovative thinking. The long historical practices of such mathematics help develop practitioners' subjectivity, leading them to believe that doing mathematics means reproducing mathematical facts and ideas without considering their sociocultural and historical values. I don't know who is responsible or whose interests are being served, but I can say that it is a hidden interest to restrict the flourishing of alternative ways of knowing. Why do I claim it? The concepts of objectivity, rationality, modernity, and universality are constructs of a Western, Eurocentric view that seems brutal to other ways of knowing. It is a kind of injustice in academia in which others' voices, values, perspectives, and ways of knowing have not been recognized.

During formal and informal conversations and debates, almost all of my research participants express their disgruntlement, either openly or diplomatically. Whatever their modes of expression, they indicate that our ME practices are not grounded in our long-standing sociocultural and historical ways of knowing and doing, which help distance them from practitioners' lives (see Box 7). It could happen during the process of modernizing and scientizing the existing epistemological practices emanating from learners' lifeworlds, labeling them as traditional, unproductive, unstructured, and lacking rigor. As indicated by my research participant, it began after the establishment of the Durbar School in 1853 and has continuously enriched its positions and practices in schools and universities in Nepal. With the introduction of the Western education system in Nepal, Western-style teaching and learning activities dominated ME practices.

The onto-epistemic singularity has been found to arise from the nexus of rational thinking, deductive proof, analytical reasoning, scientific logic, and value-neutral ideology (Luitel & Taylor, 2010). All of these have been controlled by modernity-coloniality behind the scenes (Zhao, 2020). It has not only tried to dissuade people so they cannot use their own onto-epistemic practices but also forcibly imposed a colonial framework by creating illusory omnipresent narratives. Consequently, it severely restricts or impairs learners' capacity to retrieve or develop their epistemic understanding, reasoning, and framework (Bhargava, 2013).

Here, I do not want to make any claim against the inclusion of modern scientific knowledge, innovation, and technology in the mathematics curriculum, but I do want to explore their brutal and devious colonialist presence, which resulted in the erasure of alternative knowledge and epistemologies (Powell, 2022). It signifies that

the modernity project rarely underpins mainstreaming the disenfranchised countries and their people.

The modernity project appears as a form and/or means of coloniality that exhibits its superiority through so-called purity, universality, and the certainty of scientific knowledge (Mignolo, 2007; Powell, 2022; Santos, 2016). A modernity-coloniality epistemology has been imposed upon developing countries, thereby supporting the spread of the myth of its absolutism and divinity, so that cognitive development is only possible within its framework (Paraskeva, 2016). Moreover, it establishes its epistemological superiority and has outrageously made a eugenic claim by accusing the people residing in GSTR of being uncivilized and ignorant (Paraskeva, 2021). Here, my intention is not to blame mathematicians and mathematics educators who create modern mathematics; rather, my concern is how it has been manipulated and indoctrinated in modern education. It indirectly raised questions for our universities: why they seem unable to create a discourse that leads practitioners to explore our historical ways of knowing and doing, and to enrich them.

I have understood that the modern ME rejoice and celebrate the ruling-class interests, ideology, and onto-epistemic practices that further underpin the domination of the mathematical realities and onto-epistemic practices emerged in GSTR countries (Joseph, 1987; Lamichhane & Luitel, 2023a; Santos et al., 2022). Describing the brutal role of colonial global imperatives, Regmi (2016) argues that Western-induced modern education shapes learners' subjectivity, making them greedy for materialistic pleasure at the expense of collective well-being and leading them to remain silent about the world's present crises. In a similar vein, Spivak (1988) argues that the prolonged enactment of modern education throughout the GSTR countries silently erases history, cultural practices, local scientific innovation, and onto-epistemic practices. However, un/knowingly, we still celebrate the dominant discourse of modern ME in schools and universities without admiring our onto-epistemic practices. When alternative ways of reasoning, thinking, and doing have not been acknowledged, we are fostering a culture of silence that helps conceal the different forms of oppression, one of which is epistemicide (Santos, 2007).

Epistemicide is the erasure of the epistemological practices of the people of GSTR through overreliance on the long historical legacies of colonialism, modernism, capitalism, and neoliberalism (Paraskeva, 2016, 2021; Santos, 2016). It further disconnects these people from their nature, culture, history, and ecology and urges

them to adopt the neoliberal ways of being, knowing, and doing. In this context, Santos (2016) aggressively condemns the modernity project, a form of European expansion that resulted in a "murder of knowledge and hence death of the social groups that possessed it" (p. 92). It signifies that it is not only a matter of epistemological practices within and outside the school and university premises, but also the destruction of social, cultural, and historical practices that disqualify social agents (Santos, 2016).

In other words, epistemicide is the process of subjugating ways of knowing that do not fit the dominant Eurocentric epistemological canon. It is also an act of devaluing and wasting social, historical, and cultural experiences (Phyak, 2021; Santos, 2016). In our context, as my research participants articulate, epistemicides manifest in the form of loss of unconventional forms of logics, historical and local scientific skills, cultural heritages, recognition of honest debates, and ways of knowing, doing, and living that ensure their rapid decline and lead to oblivion (Bennet, 2007; Chronaki & Lazaridou, 2022). Ignorance of epistemological plurality impedes the development of critical consciousness among practitioners, leaving them lost in the superficial, materialistic romanticism of modernity. Without a critical mindset and awareness, people rarely question the existing structure of knowledge and ways of knowing that further support the enactment of epistemicide. Deploying a model of unreflective practice in schools and universities' ME that focuses on implicit norms, values, and interests has resulted in habituating their pupils into the colonial ideological practices as natural and neutral outcomes of the system (Tanswell & Rittberg, 2020), which further supports epistemicide and stymies inquiry and transformative practices.

Uncovering Hegemonic Colonial Ideology

Examining the history of modern ME practice in Nepal reveals colonial remnants, even though Nepal has never been colonized (Lamichhane & Luitel, 2023a; Luitel & Taylor, 2010). It might be astonishing at a glance. People can raise questions about the necessity of debates on post/de-/anticolonial issues in Nepal. It is because there is no visible geographical control, invasion, or direct political intervention. It makes the invisibility of colonial presence not only in education but also in other sectors of the nation, granting colonial power centers the privilege to indoctrinate their values, perspectives, and ways of knowing (Lamichhane & Luitel, 2023b; Smith, 2012; van Stam, 2017). The colonial power centers have over glorified the notion of

modernity after the European Industrial Revolution. They have used it as a powerful means of controlling and managing countries' education systems, in the name of providing financial, technological, managerial, curricular, pedagogical, and evaluative support. Against this backdrop, I seek to uncover how the Western-Eurocentric education system hegemonizes people through the development of false consciousness, turning them into uncritical followers of Western-Eurocentric practices.

Hello Guys! You Are Illiterates! Come to School!

I grew up in a rural part of Nepal. During the 1980s, I saw that people in the countryside used skills, techniques, and knowledge to produce the daily-use materials they needed for their livelihood. In recent days, most of these livelihood instruments have been rarely observed in Nepal's urban and rural areas and are on the verge of extinction due to the dominance of the modern apparatus. I have been restricted from learning such skills, and techniques, but I had the opportunity to hear my father. He told the story of how modern education had entered our village and devalued our skills, knowledge, and techniques. The story was as follows.

It could be any day in November 1969; after sunset, dark had just dawned on the earth, and birds were chirping as they searched their nests around the trees near our house. In this beautiful scene, suddenly a loud sound rang out. Mr. Katuwal announced that all the villagers must come to Mukhiya's house by tomorrow morning at 7o'clock. I conveyed the message to my mother.

By 7 o'clock, most villagers had come to the Mukhiya's house. There was a person with different attire. Mukhiya scolded the villagers for neglecting his command to attend or for sending their children to school. Mukhiya asked, do you imagine the struggles and challenges I faced to establish the primary school in our small village? Most of you also voluntarily contributed your expertise and labor to construct the school building. Why do you volunteer in such work if you do not have an interest in education? Mukhiya kept arguing, and no one seemed responsive. There was no anarchism; no one could speak in front of the ruling-class elites.

After some time, a white man, wearing a tie, suit, and shoes, and holding a book in his hand, asked everyone, "Could you read a book?" Everyone startled and the environment became silent. Oh! You cannot read it. How can you manage your lives? What do you know? Being a youngster, I replied. I had a lot of knowledge and skills related to daily life problems. I have knowledge and skills of knitting Doko, Namlo,

Mandro, Bhakari, Dalo, Syakhu, Damlo, etc. Similarly, I can make Halo, Juwa, Danta, Janto, Dhiki, etc. I also have the skills to erect a wall and thatch a house. Likewise, women can spin to make yarn and weave Gundri, Chakati, Mudha, Ghalek, and Sweaters. People have different knowledge and skills necessary for livelihoods, such as farming, husbandry, fishery, beekeeping, honey hunting, and many more. We have exchanged our knowledge, skills, and products to fulfill our life requirements.

Mr. Gentleman replied, No! No! I do not mean what you are doing. Can you read, write, and do basic arithmetical operations? Again, I replied. I cannot read or write. We have our measurement systems and instruments, such as Mana, Pathi, Muri, and Dharni, to perform the required measurements. Likewise, I can count and do basic common addition and subtraction problems.

Meanwhile, Mukhiya appeared disappointed and admonished me for being a sage and quackery. I become silent. Again, Mr. Gentleman argued that these skills and knowledge are more tedious, traditional, and unproductive, and that they could or should not contribute to a prosperous life. You will always lag behind without a school education, regardless of the skills, knowledge, concepts, and innovative ideas you have. Modern education, which you can get in school helps you become a literate person and can shift your lifestyle, ways of thinking, and ways of doing. Because of these attributes, I would like to request that all illiterate people attend school, which opens new horizons in modern life.

I realize that the above story reflects the native education process and the objective of modern education during the 1950s and 1960s, that is, after the dawn of democracy on 1951 February 18, when modern education became available to common people. The education system in Nepal was guided mainly by modernity, with the basic assumption that native and historical practices were unproductive and lacked standardized forms.

As we erode our native knowledge, skills, and techniques, society's headmen have created and inculcated false grand narratives of literacy, modernity, and economic prosperity in people's minds. One of the most significant adverse effects on our society and nation is that approximately 98% of people were labeled illiterates and justified the necessity of modern education (NNEPC,1956). In this stage of my inquiry, my intention does not argue against the modern education or any other education systems, but my concerned is why those people who have such rich knowledge, skills, innovative ideas and concepts (as expressed in the above story)

have been labeled as illiterate, and why these skills, concepts and knowledge emanated from the lifeworlds of the Nepali people have been blamed as traditional and unproductive. Whose interests are being served by devaluing and ignoring the local cosmological knowledge systems? Is there any possibility of advancing these skills, techniques, and concepts through modern science and technology? In my opinion, our curriculum, teaching, learning, and research activities have rarely focused on these issues. We can rarely locate such literature in the field of ME practices in Nepal, which bravely explores the hegemonic ideology of modernity before the first decades of the 21st century.

In the long run, the ignorance and devaluation of native inherent knowledge, skills, and concepts, and the uncritical adoption of foreign practices, support a development inferiority complex among young generations and forcefully establish the false narrative that the West is the best (Koirala, 2021). Similarly, modern thought promotes the notion of universal education and urges us to follow its specific, rigid, and royal path. Other approaches to education that do not adopt modern strategies have been accused of being products of a conventional and savage society and nation. The organic intellectual (Gramsci, 1971) who holds to the Western-Eurocentric mindset often compares native knowledge and wisdom, which are manifested in oral practices and rarely documented and are preserved in folklores, stories, customs, and religions, with so-called scientific knowledge and treated as weak, and sometimes not as knowledge (Archibald, 2008; Chilisa, 2012). The so-called modern education seems successful in establishing the notion that Nepal is an oriental nation that needs occidental interventions (Said, 1978) to transform its primitive and traditional educational system into a modern one. In this context, the most astonishing and tragic conditions of the Nepali education system in general and ME in particular are that most of the educational policy documents, curricula, and pedagogical practices illuminate a high desire to adopt foreign education rather than enhancing and contemporizing the native inherent cosmos of knowledge, skills, and technologies (Regmi, 2021b). The consequence is that Nepal's education system has seemed unable to acknowledge its people's vast treasure of knowledge and skills.

Instead of focusing on developing positive attitudes towards social, cultural, and historical knowledge, skills, and occupations so that learners can further enhance these attributes to make them relevant to contemporary society, our education system produces human resources that either remain completely ignorant or become

condemners of these attributes (van Stam, 2017). The central contradiction that I have observed is that agriculture was the main occupation and means of livelihood for approximately 90% of the population at that period. Still, the education system had not acknowledged or recognized knowledge, skills, and techniques in different fields of agriculture, native mining skills, and the arts of making various kinds of utensils and weapons, spinning, knitting, and weaving various types of cloth, and others (Regmi, 2021a). It signifies that the country's needs, people's aspirations, and the priority of education did not align; as a result, the government could not make academic, scientific, economic, and technological progress, and has become more dependent on the West. Our younger generations learned from Western Eurocentric education that our native and inherent knowledge is primitive, imbecile, superstitious, and useless, and they have begun to condemn it (Alvares, 2011; Gandhi,1953; Nandy, 1983; van Stam, 2017). Regrettably, we can say that our higher education has not been able to explore the ground realities of the countries; instead, it seems to imitate the Western-Eurocentric education that plays a crucial role in silencing other voices and perspectives that indirectly teach the learner to become unresponsive regarding social inequality, racial/caste discrimination, and economic disparities (Apple, 2019). I have also noticed in participants' stories that modern education has not acknowledged our native and inherent ways of knowing and living, which are more co-constructive, collaborative, and co-dependent; however, there is also a neo-feudal element.

People worked together by sharing their knowledge, skills, and techniques to improve their respective occupations. People with different knowledge, skills, and resources make a group, 'Pareli', to do agricultural work for a year. Then they combinedly engaged in producing major crops such as rice, maize, wheat, and millet. They utilized their own skills, knowledge, and techniques, and available local resources, but did not hire foreign workers or resources. If a particular person did not have a specific skill, knowledge, or technique to accomplish a particular work, there was a provision for the exchange of their expertise and labor. Likewise, people had their own rules for exchanging goods and crops. For example, one Pathi paddy equals one and a half Pathi wheat, two Pathi maize and millet, a fine set of plows equals five Pathi paddy, etc. These are some of the admirable examples of collaborative, cooperative, co-constructive, and substantive practices. Unfortunately, modern education has not only disesteemed such powerful native, inherent, substantive, and environmentally friendly practices but also blamed those who possessed these skills,

techniques, concepts, and knowledge as illiterate, ignorant, and savage through the indoctrination of neo-liberal ideology and consumerist ethos.

Neo-liberalism and Consumerist Ethos

From the above discussion, I understand that colonial influences in the Nepali education system began after the establishment of the Durbar School during the Rana regime, when Rana premiers were loyal to the British Raj in India. After the dawn of democracy in 1951 and the restoration in 1990, it is rare to see a paradigm shift in policy and curriculum practices in education (Regmi, 2023). However, there are some improvements in physical facilities, teacher supply, and student enrollment. The major problem of the education system of Nepal, in general, and ME practices in particular, is the adoption of foreign mathematics (Luitel, 2009) without due consideration of our history, ways of life, biocultural diversity, and onto-epistemic practices that help create the metathetical Othering (Abtahi et al., 2020). Regarding the foreign influence and its adverse effects on ME, my research participants articulate the following views.

Pawan *points out that schools, universities, policymakers, and political leaders have not devoted themselves to bringing about a paradigm shift in education. The modern education system has neither connected school and university knowledge and skills to our long historical production process, nor has it produced the human resources that respect people and their historical occupations. Educational institutions, the government, and its line agencies have officially documented policies of efficiency, quality, and sound management to produce globally competent human resources; however, the situation has been worsening. Most graduates have not seen their secure futures in Nepal and have left the country. Unpleasantly, we are eyewitnesses to the fact that our education system has been producing unskilled labor forces for developed countries. They have struggled abroad and lived miserable lives to support their families. We can ostensively observe that people's livelihoods and the country's economic system depend on foreign laborers; however, there is no discussion of such issues in ME due to pressures on the standardized frame, an unseen force.*

Similarly, Chandra *posits that all educational activities, from the beginning of policy re/formulations, to curriculum re/design, teacher recruitment, pedagogical implications, etc., are governed and controlled by the country's political system. You can see the direct reflection of the federal government on school and university education. Our policy re/formulation and curriculum re/design have not been under*

our control. Foreign corporate institutions such as the IMF, USAID, and the WB have dominated Nepal's education system. They provided loans to improve the quality of education and development. We have become so dependent on foreign aid. We take on foreign loans even for a small-scale program, such as curriculum reform and the implementation of new assessment approaches. The donor agencies have guided almost all activities; most of them are not apparent. It is most painful for those intellectuals who do not have a personal agenda and are always oriented toward improving educational institutions and academic quality, because it is invisible. Direct physical control and political intervention are visible and easy to resist; however, the hidden interest that has been indoctrinated through the coats of modernization, development, installation of ICT, and many more. Either our authorities were unaware that foreigners do not donate to us out of selflessness, or they also derive personal benefits. Actually, foreigner want to inject their hidden interests, such as ideology, values, knowledge, and ways of knowing, at any cost. They do not want us to be independent and create a suppressive environment that no one can resist. We do nothing and appear to spectators of all events and incidents, appropriating our knowledge, values, and perspectives. We lost everything; nothing remains with us.

*As I have already stated, there are pervasive views of university ME that focus on only '**Big Ideas**'. As I experienced during my research journey, some professors, authorities, bureaucrats, and policymakers believed that exploring social, cultural, historical, and political forces and creating discourse on their relationships should not be the ME's issue. These factors do not contribute to modernizing ME, but there is a risk of pushing us back to primitive practices that do not enable learners to cope with the complex 21st-century arena. Once, I raised such issues in a public forum where the discussion of curriculum revision took place, but my voice was intentionally ignored. Later, some of the professors and authorities (unethical to announce their names) admonished me. Why did you raise those issues in the public forum? It will not support your future career. Moreover, if we deeply contemplate the issues, we can easily observe the connection between so-called modern education and the world's current crisis: environmental degradation, climate change, loss of biocultural diversity, drought, violence, and more. We need to consider these factors in 21st century ME practices to ensure a better future for human civilizations and the Earth. But mathematical activities in our school and university focus on imparting so-called*

standard knowledge and procedures that hinder learners' creative and critical capabilities.

Moreover, Bishnu *argued that over the last seven decades, Nepal has experienced absolute monarchy, constitutional monarchy, multiparty democracy, and a federal democratic republic; however, the ruling political parties have not adequately addressed the country's economic, educational, social, cultural, scientific, and technological development. We need further in-depth research into these issues to explore the factors/forces at play behind the scenes. But it can easily be understood that, after the restoration of democracy and transition to a federal democratic republic state, neo-colonial forces, which appear in the form of scientific, information communication and technological development endorsed the Western-Eurocentric thought, value, and practice through the corporate business institutions and other agencies. Another significant aspect of our ME is that our older generation and most of the newer generation teachers, teacher educators, curriculum experts, policymakers, etc., have seemed to be guided by the British-Indian education and have been captivated by the colonial mindsets. Colonial mindsets drive them to embed only technical rationality in ME programs, which cannot break Western Eurocentric views of modernity. It helps create a space for neoliberal consumerist views in education in general and in ME in particular.*

*The neoliberal ideology and its foremost underpinning, the consumerist ethos, have been spread since the newly elected democratic government of Nepal adopted its first fiscal policy in 1991. It helps develop a view of privatization, marketization, and profitization of education in general and ME in particular. It further supports germination and establishes the concept of '**Money God**'. Everything is money; all other aspects of education are secondary. Consuming expensive goods and living a materially sophisticated life have become the norm in society, particularly among the younger generation. To fulfill their ambitions and materialistic greed, they cannot find well-paying jobs in Nepal, and most youths have left the country, even though they have not found prestigious jobs in abroad. In my opinion, due to over-reliance on donor agencies, we have not been able to identify and explore our ground realities, necessities, and potentialities, and the consequence is that our education system has not been able to produce entrepreneurs and creative human resources. It produces honest consumers who have wandered worldwide in search of better jobs to fulfill their materialistic ambitions, believing they will secure their futures.*

Astonishingly, most guardians and teacher educators celebrate their global enslavement positionality and do not raise their voices against the educational system and its political supersystem.

In the above narrations, my research participants have raised numerous issues that devastate not only ME practices but also every sector of the nation, compelling us to live miserable lives. I try to capture the essence of their experiential experiences through my reflection.

The colonial burden haunts our history,
But its mutational form of neo-colonialism still prevails:
To civilize the Nepali people, make them like the Westerners,
To teach them how to discard their own culture and values.

The neo-colonial burden exploits our resources,
But its mutational form of capital liberalism persists:
To nurture Nepali people, inject the theory of modernism,
To teach them how to reject their ancestral wisdom and practices.

The capitalist liberalist burden erases our identities and dignity,
But its mutational form of neoliberalism still endures:
To liberate Nepali people, indoctrinate the uniqueness of the West,
To teach them how to forget their own onto-epistemic roots.

The neoliberal burden endangers our present and future,
But its mutational form of corporate business still remains:
To prosper Nepali people, feed them the doctrine of the money god,
To teach them how to celebrate their subjugation to the globe.

The corporate business burden induces the sixth extinction,
But its mutational form of consumerism still prevails:
To enlighten Nepali people, make them uncritical clients,
To teach them how to neutralize the present crises of the world.

A critical reading of the history of the tricontinental regions, we can find massive evidence of biocultural diversities, diverse onto-epistemic practices, substantial and environment-friendly ways of living; however, Western scholarship established a discipline of studies having prejudicial and distorted biased presumptions toward these regions and their people as backward, uncultured, and heathen to conquer the regions for imperial and colonial regimes (Young, 2016). The colonial power centers have tried to justify their colonial presence and claimed that the process of

colonization need not be understood as geographical control or encroachment, political domination and economic expansion but as pure divine selfless missions to rescue Orientals from their own uncivilized cultural, deinstitutionalized political system, economic mismanagement and social and lingual backwardness to save them from themselves and to prosper their lives (Said, 1978).

These conceptions of domination initially take hold in colonized countries through the power of modern weapons and military forces. After the independent movements during the second half of the 20th century, the colonial power centers withdrew their physical and direct political controls; however, they continue to perpetuate their domination through soft power: education, ICT, financial aid, consultancy services, and technological support, among others (van Stam, 2017). These neo-colonial strategies of subjugation have not limited to colonized countries but have perpetuated in other independent countries such as Nepal (Lamichhane & Luitel, 2023a; Luitel & Taylor, 2010; Wagle et al, 2019).

The neo-colonial presence of colonial/imperial power centers in the GSTR became a more powerful weapon to conquer the historical nations and their people. For example, colonial power centers devalued and ignored the oral histories of other countries, blaming them for lacking written, justifiable evidence. The Western intellectuals prepared and gave us our history, incorporating their own perspectives and values, and further became the tool of erasure of our history. In our ME, we were taught Western history, and even when our history was included, it was interpreted through their perspectives, thereby losing its essence and originality (Lamichhane & Luitel, 2023a). Notably, we have been taught that the concept of regular pentagon with references to Western culture that intentionally neglected our cultural practices, *Tapari* (a plate made by leaves), which has a regular pentagonal base (Figure10) that has continuously been used since the pre-ancient period in our culture in the *Dharmic Anusthan* (religious ceremony) along with its cultural and spiritual values (Lamichhane, 2019). I do not claim that the name was given by our ancestors, but they used it as a cultural practice relating to the five sense organs and the *Pancha Mahabhut* (Five elements, which are supposed to be the constituent factors of human life). They did have the relational understanding, and the *Tapari,* which does not have a pentagonal base, is regarded as impure and is not allowed to be used in *Dharmic Anusthan* (Lamichhane, 2019).

Moreover, the brutal effects of neo-colonialism on the lives of the people of GSTR are beyond the imagination of civilized human minds. The colonial power has treated the other people as objects having no emotional, cultural, or spiritual values.

Figure 10

Tapari (Plate Made by Leaves)

Aligning with this view, Fanon (1966) described colonial inhumane behavior towards other peoples as "devoid of any values: the natives are declared insensible to ethics; they represent not only the absence of values but also the negation of values. They are, let us dare to admit, the enemy of values, and in this sense, they are the absolute evil" (p. 41). It was operated by educational institutions backed by military forces, modern weapons, and technological advancement detached from human emotions and culture creating a situation of voicelessness (Said, 1978; Spivak, 1988). Likewise, the educational institutions that have grown out of colonialism and are supported by neocolonial and capitalist policies (Regmi, 2016, 2021) misrecognized other peoples and their voices, and suppressed the heterogeneity of GSTR to establish Western superiority (Rizvi et al., 2006).

In this connection, Swami Prapannacharya claimed that most ancient mathematical content originated in the lap of the Sagarmatha (Mt Everest) and was given to the West (Prapannacharya, 2015). It was further justified by historical excavations in different parts of Nepal. For instance, the mathematical symbols/ numbers Atha Bhagiya (1/8) and the word Wisati (20) were inscribed on the *Ashoka Pillar* at Lumbini, the birthplace of Lord Gautam Buddha. Similarly, a *Saka Samvat* 107 (approximately 185/186 CE) was found in the base of the *Jaya Varma* statue at Mali Guan, Kathmandu. The ligatures for 386, 100, and 200 found in the *Chagu Narayan Temple* at Bhaktapur are examples of different mathematical practices during the ancient period (Acharya, 2016, 2017a; Maskey, 2013). However, the ME practices of Nepal have not been recognized as worthy of inclusion in the history of ME. Students who have graduated from the Nepali university remain ignorant of their own history (Lamichhane & Luitel, 2023a), which can be taken as one of the hegemonic practices of the West enacted through the organic intellectual (Gramsci, 1971).

Organic intellectuals are members of elite class in civil society who support the perpetuation of hegemony by Western neocolonial and/or neoliberal power centers (Gramsci, 1971; Rudolph & Brown, 2017). In Nepal, these intellectuals un/knowingly

played a crucial role in fostering neoliberal consumerist mindsets among the general public and educators during the Rana regime and even in the democratic period. It was further strengthened through policy improvements and interventions, educational aids, technological support, and consultancy services, among others (Fanon, 1966; Luitel & Taylor, 2010). They serve as agents for foreign organizations engaged in investment, trade, economic, and political exploitation, rather than the interests of their peoples and their country, to fulfill their materialistic greed and the hidden interests of their colonial masters. Moreover, these comprador intelligentsia concealed the devastations that had grown out of the neoliberal and neocolonial conquest in ME. For instance, the decontextualization of the mathematics curriculum, the indoctrination of Western culture (Taylor & Luitel, 2010), the imposition of the Western history of ME (Lamichhane & Luitel, 2023a), and the positivist notion of mathematics and science education research (Taylor et al., 2012). The consequence is that we consent to the colonial power's accept of its values, perspectives, culture, and education, thereby perpetuating hegemony (Gramsci 1971).

For the last three or four decades, a hegemonic practice has emerged in a new, mutated form of corporate business, teaching people to be honest consumers. As my research participant, *Bishnu,* indicated, the democratic government of Nepal adopted neoliberal policies since 1991, resulting in the privatization of public companies and service sectors. It serves dominant market-oriented ideologies rather than democratic policy reforms (Zajda, 2020). It helps establish the conception of '**Money God**', in which private corporate business houses override public interest. The profit motive of corporate business fails to recognize and respect our cooperative culture of production, eco-friendly technology, and sustainable livelihood practices, thereby urging us to depend on foreign production (D'Souza, 2023). The neoliberal-backed consumerist ethos fosters a shallow, endless desire to consume goods that disrupt communal bonds and thus compels us to live a mechanistic and individualistic life (Mintz, 2021). Likewise, a neoliberal ideology adopts and promotes technocratic rationality, advocating effective resource management through a highly controlled environment to enhance efficiency and accelerate the production of goods to fulfill the corporate masters' unnatural desire to maximize profits (Shapiro, 2020).

Exploring the dreadful effects of present neoliberalism and/or neocolonialism, my research participant Bishnu has articulated that *the system has not directly killed the disenfranchised people, but they are compelled to live as a 'living corpse' because*

they are treated as the machinery forces used to produce the goods for the colonial corporate masters' benefits. They have baited us to be modern, civilized, and wealthy, and have enslaved our youth for their corporate benefits. Instated of having such adverse effects, our education system, in general, and ME, in particular, have not embanked the effect of neocolonial and/or neoliberal perpetuation, and the consequence is that we have celebrated our enslavement by introducing their educational system, incorporating their cultures and adopting a materialistic way of living in the expenses of our peaceful, eco-friendly and spiritual sensible communal culture of living.

Describing the neoliberal and/or neocolonial capitalist structure of the global political and economic policy, Paulo Freire mentioned, what magical excellence has in their hand that manage the billions of inhabitants of the developing world who live in severe poverty, what excellence is this that makes deep sleep in a state of seemingly peaceful mind, while numberless peoples make their home in the street and say it is their own fault and sin of their unethical behaviour, and what excellence is this that restrain the struggles at all, with discrimination of reasons of class, race/ethnicity, gender, economic inequality, socially unjust practices, disparity of wealth, educational and medical facilities and devastation of natural resources, in which there is no more interest of suppression for their own personal benefits (Freire, 2014). In this stage of my inquiry, I have realized that to explore how neoliberal and/or neocolonial forms of chronic capitalism become norms, common assumptions, beliefs, and common sense that frame our thoughts and actions, a cultural hegemony (Gramsci, 1971).

According to Gramsci (1971), hegemony is the state of mind of the billions of people in the developing world who give spontaneous consent to the dominant groups to impose their values and norms as unique and irrefutable truths. In the present 21st-century context of the dominant neoliberal and/or neocolonial era, the dominant group comprises the top 1% of corporate elites who control the global political economy and have ruled over the 99% of the population (Bello, 2013). The recent World Inequality Report (World Inequality Lab, 2022) indicated that the top 1% of people account for 19% of total yearly income and hold 38% of total wealth. In contrast, the bottom 50% of the population receives 8% of income and has only 2% of wealth. Likewise, analyzing global inequality between 1700 and 2012, Piketty (2014) concluded that the approximate world-average per capita GDP percentage difference between Europe-America and Asia-Africa in 1700 was 65%, whereas in 2012 it was 262%.

The inequality level has not only occurred among underdeveloped, developing, and developed countries; there is a terrible picture of income and wealth inequalities within a country. For example, the top one percent of the richest families in the US held 56% of US equities in 2019 (Schwab & Vanham, 2021). Likewise, in Nepal, the income of the richest 10% of families is more than three times that of the poorest 40% (Oxfam, 2019a). The inequality of wealth in Nepal's population has shown that money is trickling upward over time. The richest 10% of the Nepali people have more than 26 times the wealth of the poorest 40% (Oxfam, 2019a). The consequence is that approximately 8.1 million Nepalis live in poverty (Oxfam, 2019a). In this context, Schwab and Vanham (2021) argued that a neoliberal political economy only focuses on growth and profit-making policies that only enhance consumerism and forget the well-being of the people and leading to the exploitation and destruction of natural resources; the evidence is level of air pollution, contamination of water, deforestation, global warming, dumping of plastic on oceans, depletion of glaciers, and among others, affect the survival and health of the planet and the well-being of the people. In this situation, everyone can question how these could be possible.

In my opinion, it is made possible through our education system that helps foster the hegemonic ideology because schools and universities are shaped and influenced by the neocolonial/neoliberal capitalistic assumption in which curriculum contents and major mathematical theories/model/contents (Greer & Mukhopadhya, 2016) and economic theories are adopted without their applicability in solving the current problems of inequality, violence, hunger, malnutrition and environmental degradation, among others (Schwab & Vanham, 2021). In my journey with ME, I have not had the opportunity to engage in a discourse on the above-mentioned issues: the distempering features of political economy and education policies. Greer and Mukhopadhya (2016) further argued that there is a rare example of a university mathematics department that offers courses on social, cultural, political, and economic justice. Rather than allowing for critiquing the adverse effects of neocolonial consumerist ethos on human beings and the health of the planet, formal academic institutions have focused on advancing the hegemonic assumptions of neoliberalism. It portrays human beings as superior agents of the earth, engaged in accumulation, wealth expansion, and consumption of material products (Sagage, 2017).

Likewise, it induces concepts of individual freedom, competitiveness, free trade, and free enterprise (Zajda, 2020), which resulted in developing the conception

of social Darwinism (Andreotti, 2011; Spivak, 2004; Tobach, 1972, as cited in Stroud & Baines, 2019) that possibly led to the sixth extinction (Braidotti, 2019). The neoliberal assumption of consumerism has shifted the dictum of the modernist era of individualism: 'I think therefore I am' into 'I shop therefore I am' as the artist Barbara Kruger expressed (Baudrillard, 1988; as cited in Ernest, 2016a). Through the indoctrination of the consumerist ethos and corporate culture that hegemonizes society by defining the successful individual in terms of living standard, income, and consumption within a capitalist society (Giroux, 2002; Kabir, 2012).

Moreover, another powerful tool used by the colonial power bloc is the creation of the global network through the establishment of financial institutions, such as the WB, OECD, IMF, etc., that work to imbue the neoliberal assumption for granted by creating the fear of isolation from the international communities (Regmi, 2016). They established the notion of a successful life as having expensive clothes, an iPhone, a house, a sophisticated car, a choice of places for holiday and leisure times, eating and drinking preferences, etc., that help create illusions among the youngsters and thus unconsciously fall into the hegemonic grips of the neoliberal/neocolonial consumerism and find it difficult to escape from it. In this situation, the role of education is crucial; however, our ME in particular, and the education system in general, have not been able to break the narrow boundaries of modernism, which ultimately promoted the neocolonial/neoliberal ideology (D'Souza, 2023). The modern educational structure in GSTR seems to be designed to inculcate the people of the region with myths and beliefs that deny and belittle their history, culture, experiences, values, and languages (Macedo et al., 2003), claiming that this is necessary for being civilized nations and attaining prosperity. It signifies that the asymmetrical distribution of power, income, and wealth among and within countries has been supported by neoliberal policies and perpetuated by education systems that urge the majority of marginalized people to accept hegemonic practices (Macedo et al., 2003).

Hello Friends! Speak English! Be Smart and Intelligent!

I grew up in a family in which Nepali is my mother tongue. During my primary schooling (grades 1-3), the medium of instruction was Nepali, and no foreign subject was included in the curriculum. English was introduced as a subject in grade four. Translation of English words or sentences into Nepali was the teaching method (See Box 1). Teachers wrote all the new terms on the blackboard and chanted them with their spellings. We were asked to repeat the words. It looked like taking an oath in a

specific ceremony. There was no two-way communication in the classroom because we were unable to participate in discussions in English, which certainly demotivated us to learn and hindered our academic development (Phyak & Sah, 2022).

As I remember, during the School Leaving Certificate (SLC) examination, I attended a tuition class. My English tutor provided detailed notes that included grammatical rules and examples, answer sheets for selected short and long-answer questions, and 12-15 essays likely to appear in upcoming SLC exams. We used to have to complete the given task to pass the SLC exam. I learned all the questions through rote memorization because I did not have an alternative. If the question paper consisted of the guessed questions, then we passed; otherwise, we failed the exam. Fortunately, I was blessed; the SLC question paper consisted of some guessed questions that helped me pass the exam. If I had not had so, I cannot imagine what my future career could have been.

The medium of instruction and textbooks in school-level education, except for English, were Nepali, which facilitated my engagement in learning. I had found English a tedious and challenging subject because I had not grasped the meaning and context of the texts. When I entered university, I encountered English as the medium of instruction in mathematics classes as well. Most of the textbooks were written in English. Because reference materials were unavailable, we had to rely on the teachers' notes provided during class. Some reference materials available in the campus library were in English, which did not facilitate my learning because I was poor in English and did not understand the text.

It could be any day in July 1992; it was my first class at the university level. An English teacher entered the room. He asked to translate the Nepali text into English (see Box 6). The class size was too large; approximately 60-65 students were in the class. I was not able to translate it. He quickly observed the students' notebooks. He did not seem to be satisfied with the translation made by the students. He gave a long, monotonous lecture describing the role of English in the present globalized world. The conclusion was that we need strong English knowledge and communication skills to be smart and intelligent; otherwise, we may be doomed to be third-class citizens. I became speechless and afraid of the journey ahead in university education because I was, and still am, poor in English and have no good communication skills in English.

After the first period, students scattered to different classrooms to take classes in their optional subjects. We ran to the small room to take the mathematics class. There were approximately 15-20 students in the class. The teacher entered the class with an old book in hand. After a short introductory session and a brief glimpse of the courses, he wrote a topic on the blackboard. The topic was the permutation of 'n' different objects taken 'r' at a time. He derived the formula of permutation $n_{c_r} = \frac{n!}{(n-r)!}$. It was full of descriptions that seemed like an English essay covering more than half a page. All of us hurriedly copied the derivation. I did not clearly understand his handwriting and the meaning of the technical terms used in the derivation process. I completed the note with the help of my nearby friends. The topic was entirely new to us because it was not introduced in school. I bravely decided to ask the teacher the questions. Sir, I come from a government school where the medium of instruction was Nepali. So, I find it difficult to understand the descriptions. Can you explain it in Nepali?

म नारायणी बहुमुखी क्याम्पसमा पढ्छु।

महाकवि लक्ष्मि प्रसाद देवकोटा बहुमुखी प्रतिभाका व्यक्ति थिए।

आज मुसलधारे पानी पर्छ होला।

Box 6 *Text Given for Translation*

He seemed somewhat annoyed by my question. He began delivering his speech in the same way as in the previous class. I think most of you take a mathematics class without understanding its essence and significance, and you do so under the influence of someone else. It is better not to wander without first determining one's goals and objectives. Today's topic is very simple and the easiest one. How can you learn complex mathematical concepts and theorems if you do not understand the English language? You need to develop your English skills, which will help you learn not only mathematics but also other subjects at the university level. A university is a place that produces internationally competent human resources. In the present era of globalization, the English language is a fundamental attribute for achieving prosperity in our lives. University education is not for all, as school education is. It is only for intelligent people who can further contribute to society and the nation through the innovation of mathematics, science, and technology. More precisely, mathematics is the queen of all sciences that underpins all scientific innovation. In this regard, it is better for those who lack command of English to shift to other disciplines such as Nepali, history, and political science. After finishing his speech, he wrote various

formulae for the permutations needed to solve the bookish questions and asked us to prove them.

When I went to bed that night, I began reflecting on classroom activities. English and mathematics teachers emphasized that English is the most essential attribute of higher education. Being poor in English means being excluded from almost all sectors of a future career. I became unsure whether I should continue studying mathematics as a future career. I got lost for some time as I alarmingly pondered my future career. Is English necessary to learn mathematics and other technical subjects? Do most countries develop through the English language or something else? Again, I began reflecting on my academic achievement up to the SLC examination. I have passed the SLC and secured first-division marks. If I am not capable of enrolling in ME as my major (optional) subject, who is capable? To honor my academic achievements, I do not hesitate to pursue a career in mathematics. I need to take a risk. I remember the famous adage 'no risk, no gain'. After a few monologues, I finally decided to pursue a career in mathematics.

When contemplating my ME journey, the above events always strike me and raise some questions in my mind. Why do our university teachers focus on English as a medium of instruction? Does English as a medium of instruction enhance the quality of education? Why do these people take speaking English as a matter of prestige? Can we not perform teaching-learning activities in mathematics in the mother tongue? Does the Nepali language affect the quality of ME? What forces compel us to use English as a medium of instruction? I am confused about whether foreign language matters or creative, innovative, and critical thinking, higher-order reasoning, and problem-solving skills matter in the educational program**.** Arriving at this point of inquiry, I came to realize that the neoliberal view of education has a devastating effect on our education that disrupts our onto-epistemic positionality, helps establish and perpetuate the universal norms, values, and ideology (Lamichhane & Luitel, 2023b), which have been underpinned by the English as a language of instruction (Phyak & Sah, 2022). Researchers (David, 2020; Macedo et al., 2003) stated that the neoliberal political and economic policy, a form of super-colonialism (van Stam, 2017), has created a myth of English as a symbol of modernity.

A neoliberal/neocolonial political-economic policy of the Western-Eurocentric countries uses language as one of the surest means of inculcating the hegemonic ideology. For example, in a school-level English textbook in the late 1970s, there were

some pictures of gentlemen and ladies in Western-style attire quite different from our culture that insistently distort the childish mentality that to be a gentleman, it is necessary to adopt the Western lifestyle, a form of hegemonic culture inculcated through the name of English language and/or English education (Poudel, 2022).

The EMI policy has sustained the ideology of 'contempt' towards other languages that disconfirms rather than enriches meaningful cultural experiences for non-English-speaking communities. It upholds the view that anticipating the mother tongue/native language policy is 'onerous' (Hudson, 2010; Macedo et al., 2003; Philips, 2004), thereby disrupting the modernization and scientization of education. Moreover, in the context of south Asian subcontinent, the EMI policy has been heavily influenced by the *British Raj* in India, which promoted the English language as the standard norms of social, political and economic prosperity aimed to prepare the huge intellectual group that seemed physically Indian but supported implicitly to endorse Western (English) language, values, opinion and morals (Macaulay, 1972) by positioning some of them in high government official and business sectors.

The colonial power wanted to bait the people by promoting a materialistic view that the English language could ensure social, economic, and political superiority. Obviously, Nepal had not remained isolated from this policy, as it had adopted the Indian curriculum and assessment system in school and university education (Shrestha, 2008). It indicates that EMI policy is not neutral and value-free (Macedo et al., 2003). The colonial power imposed its language through education, business, science, and techno-cultural tools, which continued to uphold hegemony to this day (van Stam, 2017). Speaking a language means adopting the culture of its speakers and implicitly lending weight to the civilization of its origin; that is, it is more than just transmitting information by following certain syntactic structures. The colonial dominant EMI has powerful effects on learning that shape not only how the learner absorbs knowledge and culture of origin (Hudson, 2010) but also hinder the cognitive development of non-English speaking children, which controls the mental universe of the subjects by means of which the West secured hegemonic domination (Thiong'o, 1986).

Indicating the hegemonic domination of prolonged enactment of the foreign aid-controlled (still controls) educational policy and its impact on the mental universe of the organic intellectual (Gramsci, 1971), my research participant, Bishnu, expressed his views. *Nowadays, I think that our intellectuals, basically those who are directly involved in the policy formation process and curriculum (re)formation practices, have*

been educated and trained by the Euro-Indian educational practices, which have been spread throughout the South-Asian subcontinent during the British Raj in India, and still prevail in our curriculum practices. It is very difficult to escape from it because it is deeply rooted in practitioners' mindsets, resulting in a set of non-transformative educational behavioral structures. One such impact is the EMI policy, which severely hinders educational activities and the quality of education.

Aligning with this view, another critical participant, Durga, argued that *it is better to convert our educational institution into a language institution. Most schools and colleges/campuses have advertised that they have adopted the EMI policy to attract students. English has become the indicator of educational quality. However, there is a declining trend in higher education student enrollment. Our education has not illuminated the values of cultural heritage, language, and native onto-epistemic practices as essential components for preserving our identity. We have gradually lost our identity because of the overinfluence of foreign languages and cultures. The most significant impact of Western ideological domination is that it has taught our young generation that materialistic achievement is everything rather than our cultural, social, historical, and linguistic identity. Developed countries have lured our youth, aiming to provide the cheapest labor. They have made it compulsory to learn their language to get permission to enter their countries. In this way, developed countries have used their language as a powerful weapon to subjugate other language-speaking populations.*

The above arguments of my research participants revealed that the dominant ideology, which favors one particular language as a standard norm, labels other languages as 'jargons' or 'patois' and blames people who use their native languages as ignorant and unintelligent. The slogan "English for the children" gradually created spaces in the Nepali educational milieu after the Rana families brought foreign teachers to teach English to their siblings. It was later supported by the organic intellectuals, who played a dominant role in shaping and supporting the educational policies and practices endorsed by the foreign aid agencies (Regmi, 2023). In this context, the incessant debates over multi/bilingual education clearly illustrate the mechanism of linguistic hegemony in the nation. Antonio Gramsci aptly argued that when language becomes a central issue, it instigates the impending emergence of several related problems. These issues include the development and expansion of the dominant class, the establishment of secure connections between ruling elites and the

general population, and the restructuring of cultural dominance (Gramsci, 1971). The neocolonial power center always tries to grip the disenfranchised countries and their people within its interests. In so doing, they have altered their strategies accordingly. They used physical power—military forces and ultra-modern weapons to conquer the tricontinental regions and their people before the independent movement.

After the independent movements in the second half of the 20th century, colonial power centers have continuously used education, language, technological tools, and financial aid to control the habits of mind, which is more harmful than physical encroachment (Thiong'o, 1986). Through their neoliberal economic policy, the neocolonial power center seems successful in associating English with material prosperity to the extent that acquiring English is deemed necessary in the complex technological society (Macedo, 2003). The neoliberal economic policy has acted as a new mutation of historical colonial practices, establishing the notion of globalization as westernization (Luitel & Taylor, 2010). It advocates English as a superior language and urges developing countries to implement the 'English for a Child' policy. This perspective portrays English as innocuous and something that all societies strive to compete in the globalized world economy. Such a narrative has been created to blur the dominance postures of the neocolonial/neoliberal-backed educational policy. Freire (2014) described it as discriminatory, subpar, and insidious, restraining learners within the mesh of the verbatim.

Chapter Summary

In this chapter, I have addressed the first part of the first research question: how has colonial legacy informed the ME curriculum? I have explored how I encountered a dead curriculum, how an exclusive view of reality is perpetuated, how our curriculum neutralizes and naturalizes epistemicide, and, finally, how colonial hegemonic ideology has dominated the mathematics curriculum in Nepal. During the inquiry process, I have found that the mathematics curriculum dehumanizes teachers and students by forcing them to follow a prescribed, highly controlled, centralized, and bureaucratic race track that leads to a dead end. The mathematics curriculum becomes lifeless because it describes the social, cultural, historical, and ecological milieu as the significant obstacles to achieving the prescribed end. Likewise, I found that the mathematics curriculum is profoundly shaped by Tayler's rational model, which enriches the factory model of education, in which learners are regarded as raw material that can be shaped according to the interests of the elite ruling groups. The

reproductive model casts the curriculum as a journey through a dark tunnel. It further reinforces the image of curriculum as a form of social reproduction that does not teach learners to challenge and disrupt the 'status quo' and taken-for-granted assumptions, thereby perpetuating a monocultural view of reality.

The next feature that implicitly governs the mathematics curriculum is the exclusive view of reality that rarely recognizes and acknowledges the other forms of reality emanating from the lifeworld practices of people of GSTR. In the guise of scientific rationality, linear deductive thinking, operational certainty, and the efficiency of mathematical modeling to represent real-world problems, the modern curriculum engulfs contextual and subjective realities, fostering mathematical impassivity and a monoculture of knowledge production. Moreover, Western Eurocentric thought not only seems brutal towards other forms of knowledge but is also inclined to destroy them. In this process, the intellectual elites working as the comprador intelligentsia help perpetuate and sustain the colonial legacy not only in education but also in other sectors of society and the nation. By disqualifying social, cultural, historical, and native agents, the modern mathematics curriculum compelled them to assimilate to modern ways of knowing, doing, and being.

Last but not least, I found that the present mathematics curriculum practices implicitly and explicitly blame the people from the GSTR as illiterate and uncivilized, thereby establishing the colonial domination and subordination as the civilized project. In doing so, they utilized neoliberal assumptions about consumerism as the ethos of modern education, in which materialistic magnification of life is the ultimate goal. It enriches the concepts of competition, privatization, and individualization rather than promoting collaboration, social welfare, and collective well-being. Moreover, I have realized that to perpetuate the colonial hegemonic legacy in educational institutions, society, and nation, English was forcibly imposed as the medium of instruction in a multilingual society, which explicitly contributes to the erasure of linguistic diversity that provides a strong foundation for creating homogenization across societies, educational institutions, and nations. In this connection, I am highly enthusiastic to unearth pedagogical practices informed by the curriculum with the above-stated features.

In the next chapter, I articulate how my research participants and I experienced the colonial legacy in mathematics pedagogy and attempt to de/reconstruct it.

CHAPTER V
DECONSTRUCTING PREVAILING PEDAGOGY: UNMASKING POWER AND IDEOLOGY

Pedagogy in ME in Nepal has faced severe criticism due to students' underachievement in the SEE. Media, parents, curriculum designers, government officials, teachers, and students are in turmoil within and around one to two weeks after the publication of the SEE results. The debates are around the periphery of enacted curriculum and pedagogy rather than generating discourse that can bring about a paradigm shift in mathematics pedagogy. As an insider practitioner, I have observed such a scenario for the last four decades. The debates taking place in academia have not seemed to be oriented toward resolving the issue. Instead, stakeholders (curriculum designers/experts, governmental officials, teachers, professors, parents, and students) have un/knowingly involved in accusing each other of being unable to produce expected results (Luitel, 2009).

The blaming culture in academic institutions disrupts harmonious collaboration and cooperation among stakeholders, thereby negatively impacting overall educational activities. It could happen because of the unwillingness to take sole ownership of the program. Everyone sidesteps the problem around them and forcefully wants to establish their success. They treat curriculum, pedagogy, and assessment as independent attributes, mechanically applied and producing no effects on one another. This isolated thinking creates a barricade to coming together and impedes the quest for inheritance solutions embedded within the system and stakeholders. In this regard, I have tried to capture my experiences of a mathematics pedagogy in the following poem.

Pedagogy illustrates the certainty,
Beneath the contradictions and inconsistencies.
instigating fear and pain,
Conceptual comprehension remains in suspense.

Pedagogy illuminates the facades of rigid orders and structures,
Concealing the cognitive power of learners as constructors.
Baiting learners to be seekers of external recognition,
Orienting to solve bookish problems but not actualization.

Pedagogical impairment suppresses the voice and vision,
Incarcerating students in a classroom without reason.
Urging students to follow instructions without question,
Producing silence to maintain the 'status quo' as a social norm.
Challenging granted assumptions and values is a sign of sin,
Adopting hegemonic structures is part of pedagogical affine.
Subjugating other forms of knowing is an ethical sanction,
Abandoning critical thinking is a pedagogical action.
Concealing other forms of onto-epistemic practices,
Intending to domesticate learners as barbarians
Surpassing others by its pedagogical uniqueness
Underpinning colonial ideology and cultural imperialism,
Existing pedagogy hegemonizes our learning.

In this context, I have some questions about the pedagogical issues of ME. Where does such isolated and mechanical thinking spurt out? Are the pedagogical practices responsible for enhancing mechanistic thinking? Are there any interests that compel the practitioners to hold a mechanistic view of pedagogy? To address these questions, I have explored pedagogical practices in mathematics education that might help readers understand existing practices and recognize the implicit and explicit forces behind them, prompting them to reflect critically on their own.

Pedagogy as/for Developing Magic/naïve Consciousness

I grew up in a rural part of Nepal where agriculture was the primary livelihood. People engage in sustainable farming by exchanging skills, knowledge, and concepts. They had rich knowledge and skills in knitting clothes and in the construction of farming instruments—*Kuto, Kodalo, Halo, Juwa*, and other daily-use gadgets—*Doko, Namlo, Bhakari, Mandro, Damlo, Mudush, Chakati, Khatiya,* and many more. They rarely imported/hired foreign instruments, seeds, fertilizers, labor forces, etc. People did self-sustained farming and lived interdependent lives. However, after introducing a so-called modern education, they were blamed for being illiterate and uncivilized (see Chapter I). Modern education has not recognized the Nepali peoples' knowledge, skills, and onto-epistemic practices and created a narrative of the necessity of civilizing them by inculcating foreign education (Lamichhane & Luitel, 2023a). It focuses on imparting the official knowledge through the instrumental lock-step algorithm, in which students rarely see the connection to their immediate environment.

It could be any day in June 1996; I was a B.Ed. Second-year student. It was a Differential Calculus class. The bell rang, and all of us rushed into the classroom. Mr. Singh was already at the blackboard, writing down the statement of the Mean Value Theorem. We (students) were too busy to copy the statement. He did not ask us how we were doing. He seemed to engage in a monologue as if he were talking to himself.

It is a new topic. It is the most important theorem of Differential Calculus. Most of the theorems on Differential Calculus are based on this theorem. We prove it using Rolle's theorem, which I taught yesterday. However, I (and probably other students) did not understand the essence of Rolle's theorem because Mr. Singh did not present it in the context of real-world problems. I copied and repeatedly reproduced it to memorize the algorithms of proving. He started proving the theorem using his notebook (the teacher's notebook), and we hurriedly copied it. The proof of the theorem looks like this.

***Lagrange's Mean Value Theorem**: If a function f is (i) continuous in a closed interval [a, b] and (ii) derivable in an open interval (a, b), then there exists at least one value* $c \in (a, b)$ *such that* $f'(c) = \frac{f(b)-f(a)}{b-a}$

***Proof:** Let us define a function* $h(x) = f(x) + A\,x,\ x \in (a, b)$, *where A is a constant to be determined such that h (a) = h(b).*

Thus, $f(a) + A\,a = f(b) + A\,b \rightarrow A = -\frac{f(b)-f(a)}{b-a}$

Now, the function $f(x)$ *is derivable in (a, b). Also,* x *is derivable, and A is constant. Therefore,* $h(x)$ *is derivable in (a, b). Thus* $h(x)$ *satisfies all the conditions of Rolle's theorem. Therefore, there is at least one* $c \in (a, b)$ *such that*

$h'(c) = 0, so\ that\ we\ have, h'(c) = 0 = f'(c) + A \rightarrow f'(c) = -A$

Therefore, $f'(c) = \frac{f(b)-f(a)}{b-a}$. *Hence, the theorem.*

After copying the theorem, I raised a question regarding the supposition of the function $h(x) = f(x) + A(x)$ *so as* $h(a) = h(b)$ *to prove the theorem. What was the reason behind it? Why did we suppose? Where did it come from? Was there any alternative method? How did we know to assume a specific function to prove a particular theorem? Mr. Singh did not address my queries; instead, he indirectly accused me of being unintelligent and dishonest. He added that it involves mathematical rules and methods of proof. Why do you need another way to prove the theorem? Please focus on a particular method that makes you familiar with the*

theorem and its ways of proving. It is very short and simple. You can easily learn such theorems through drills and practice that build your confidence. It would be beneficial for the exam rather than wandering in search of alternative methods that further burden you. Again, I asked other questions. Sir, this course has many theorems; how many tricks and steps do we need to remember to prove them and solve the questions? It seems illogical and does not focus on enhancing conceptual understanding; rather, it emphasizes storing information and remembering the steps for proving mathematical theorems and the algorithms for solving bookish questions. Sir, could you provide an example of a curve that demonstrates or illustrates the mean value theorem in a real-world context?

For a while, Mr. Singh lost his patience and did not let me continue arguing. He ventilated his discontent with my opinions. Mathematics is a highly rigorous subject; its technical terms and specific procedures are necessary to accelerate mathematical learning. Raising questions regarding its fundamental techniques and algorithms is nothing but the disowning of mathematical learning. Mathematics learning requires higher ability, reasoning, and problem-solving skills. As a rigorous, abstract, structural, and concise subject, many students are reluctant to pursue a career in mathematics. You must devote more time to learning mathematical knowledge, concepts, theorems, and skills through boundless practice; otherwise, you will not accelerate mathematics learning. It is the best mantra for mathematics learning. I learned most mathematical theorems and problems in a similar manner, which helped me secure good marks in the final examination. After listening to his arguments, I became speechless. Most of the content in Differential Calculus and other subject areas of mathematics has been taught in ways that not only sidestep conceptual and relational understanding but also make students accumulators of lifeless formulae and theorems for examination preparation and future teaching. As I remember, I learned some mathematical theorems by writing them 10 to 15 times each, without any conceptual or relational understanding of their applications or implications.

When I reflect critically on my past experiences as a mathematics student, teacher, and teacher educator before graduating MPhil. in ME, I found that mathematics pedagogy has not gone beyond mechanistic sequences aimed at reproducing abstract theorems. The mechanistic pedagogy reduces teaching to a transmissionist model that propagates a culture of prescription and conformity. The

conformist pedagogue operates a mathematics classroom under the sway of technical procedures, emphasizing instrumental mastery, utilizing dualistic logic (Giroux, 2020a).

A pedagogical approach that aims to develop an instrumental understanding presents the subject matter in a linear, reductionist way, breaking it down into small, manageable propositions. These propositions are either true or false, and the truthiness of compound statements is judged based on them. There is no further interpretation and discourse. If students raised any doubts about mathematical theorems, teachers always forced them to stop asking questions and to follow the instructions and rules of scientific logic. It did not make sense. In this context, I think that mathematics is a formal subject that fails to consider its implications in the immediate environment and glorifies scientific logic and deductive proof as a panacea for all mathematical problems. However, its propositional—non-ambivalence, declarative, if…thenism, and functional representation, which have been derived from deductive reasoning and analytical method, further develop dualistic thinking, thereby ignoring the other sides of mathematics (Hersh, 1997; Luitel, 2013). Such conceptions further drive teachers to hold the instrumentalist pedagogical approach (Lamichhane, 2017). It is underpinned by the Newtonian worldview, deeply pervasive in teachers' and public mindsets, in which mathematics is perceived as a pure, objective, certain, incorrigible, perfect, other-worldly, and value-free discipline (Ernest, 2008; Lamichhane, 2021; Luitel, 2013).

This absolutist view of mathematics promotes objective epistemology (Ernest, 2015; Lamichhane, 2017). The objective epistemological position leads teachers to adopt rigid, instrumental procedures in teaching and learning that do nothing but reproduce mathematical knowledge and theorems, thereby fostering a magical/naïve consciousness. In this context, the teacher's task is to bring other-worldly mathematics into the classroom without distorting its purity and divinity. Students are urged to be competent and efficient through the mastery of subject matter. In this context, my participant, *Durga,* has explained the existing pedagogical practices of ME in the following ways:

As long as I can remember, my academic and professional journey, the teaching-learning activities were, and still are, oriented toward preparing for the final examination. It focuses on completing the course (the bookish exercise) promptly rather than on developing creative and innovative thinking and problem-solving skills.

It is not only the teacher's deficit. Indeed, teachers can make a difference; however, they have already been circumscribed by many factors—curricula and evaluation procedures. More precisely, parents, teachers, students, and other concerned authorities' perspectives towards education matters in educational activities. What do you mean by education? Is it only preparation for the examination, or is it beyond that? Most discourses in our school and university ME have not gone beyond the percentage of students who passed or failed in a particular test. It is a proud moment for teachers when all the students they have taught are declared successful in a specific test (final examination). Mathematics pedagogy seems superficial, unidimensional, and disengaged, focusing only on content delivery. There is a rare discussion on what it means to succeed in the test. Is the aim of mathematics education to prepare students to pass the exams?

From the above narrative, I conclude that pedagogy in ME is characterized by oversimplification and the magical explanation of learning as preparation for examinations, without considering other aspects of learning. The fanciful explanation of mathematical facts, concepts, and objects as static, rigid, and certain, and of pedagogy as pouring content into learners' empty vessels, hinders creative and critical thinking and innovative action (Freire, 2005; Lamichhane, 2019). Students have begun to enjoy the passivity of learning and of life, even though they are marginalized (Stephan et al., 2021). The magical or naïve explanation of mathematical content impaired learners' critical faculties and, thus, left them more disengaged from reality and incapable of the thoughtfulness necessary for liberatory action (Freire, 2005; Giroux, 2020a). They are under the illusion that their actions will bring liberation, but are defeated and dominated.

Students and teachers are not autonomous in selecting their learning experiences because they are directed by authorities who formulate educational policies, design curricula, and evaluate students' achievement (Upadhyay et al., 2021). A mechanical pedagogy leaves learners far from real-world problems so that they cannot apprehend the issues beyond the system and remain ignorant about the roles of social, cultural, historical, and political forces in shaping educational practices that inhibit their creative power and oblige them to adjust to a disparate world (Freire, 2005; Giroux, 2020a). In the words of Gutstein (2016), mechanical pedagogy focuses on transforming classical (mathematical) knowledge and academic mathematics that deals with abstract or formal mathematics far from real-world problems, rather than

community knowledge; knowledge of one's reality, experience, culture, history, and experiential ways of relating to and interpreting the world. It is an anti-historical conception of modern mathematics that restricts learners to instrumental and functional understanding.

The prolonged implementation of modern mathematics and its accompanying pedagogical practices has induced a massified consciousness that learning mathematics means storing mathematical information, formulae, concepts, and theorems in the mind for reiteration in examinations. The mass media and other stakeholders further support it, and it has become a common assumption (Brookfield, 2017), relatively unchallenged by teachers and students. Learners who accept or are circumscribed by commonsense assumptions participate in their own domination by replicating informative pedagogy that only disseminates information in isolation from social, cultural, political, and historical milieus that hinder creative and critical thinking (Stephan et al., 2021). Resources, information, or data drawn from the subjective worlds of intuition, emotion, philosophy, and theoretical discourse are not acknowledged in ME (Giroux, 2020a). In this regard, Martinez and Yeong (2019) argue that mathematics becomes nothing more than mechanical without critical reflection, and that this mechanical process becomes a dehumanizing force that shifts the learner from a position of subject to object (Freire, 2005).

In line with the above view, my research participant, Bishnu**,** has expressed disagreement with ME's pedagogical practices. In his opinion, *our universities have become training centers rather than academic institutions. I have used the term training center because our universities very rarely generate new discourse in ME. As mathematics teacher educators, we adopt an instrumentalist approach. It looks like training for workers to handle particular machines. It would benefit the workers because the machine is static and has a fixed configuration that has not changed after installation. We treat learners as objects because we do not acknowledge their emotional, spiritual, social, cultural, and economic aspects, which significantly affect learning. Teachers, in particular, and our education system, in general, have not heard the learners' voices. In this context, I always remember my first class in vector geometry.*

I learned that the sum of the two sides of a triangle is always greater than the third side, but in vector geometry, the sum of the two sides equals the third side. When I raised the question regarding the vector sum of a triangle, the readymade answer

was that it is a law (rule) of vector addition. I never understood this concept until the end of my Master's Degree in ME. But I learned it by rote memorization. Later, I taught similarly. In so doing, I used arbitrary power as a teacher. Teachers always want to remain in their comfort zone. They have never questioned taken-for-granted assumptions and do not want to take risks. There are ample examples in my academic and professional journey as a student, teacher, and teacher educator that help illustrate mathematics pedagogy; among them, one might benefit you (indicating me). Let me share it.

After completing my Master's Degree in ME, I began teaching at a private school in Kathmandu. I was highly enthusiastic about using the mathematical techniques I had learned. In so doing, I developed a concrete model of $(a + b)^3$ *to illustrate how its formula is constructed. I allowed students to manipulate, observe, form, and deform the model to visualize its constituent parts, helping them grasp its meaning. However, our students seem dissatisfied. One of the students asked why we need such a lengthy explanation. You spend almost a class time giving formulae. We need a formula for solving the questions. We do not want to complicate the explanation with such complexity. Most of the students also agreed with his argument. Can you guess why I share this incident? It is to illustrate how our ME shapes students' mindsets. My intention is not to blame students. I mean that it becomes our habit; as I already mentioned, we, as teacher educators, cannot create a learning culture in which teachers and students engage simultaneously in learning by raising questions to each other, but simply transmit fancy knowledge to students. Our (teachers, students, curriculum experts, parents, and other concerned authorities) mindsets have been overly polluted by instrumental algorithms that treat learning mathematics as solving bookish problems without conceptual or relational understanding.*

From the above narrative, I have concluded that pedagogy in ME has been shaped by teachers' and students' beliefs. When teachers view mathematics as already existing knowledge residing in another world (the mathematical world) waiting to be transmitted to students (Lamichhane & Luitel, 2022; Lerman, 1990; Luitel, 2013), they inadvertently adopt a mechanistic pedagogy. In such pedagogical practices, learners are treated as objects rather than subjects (Freire, 2005), inhibiting creative thinking and actions.

The objectification of learners indicates a lack of creative, innovative, and critical thinking, in which they un/willingly accept the taken-for-granted assumptions—social hierarchy, inequality, and unjust economic status—as natural and neutral outcomes of the system, thereby making them inevitable. In this regard, Aronowitz poignantly argued that higher education becomes less about learning and more akin to vocational training that reproduces workers for the ruling class (Morley, 2013). It means that schools and universities become bureaucratic institutions that misguide students, compelling them to comply with authority to strengthen the existing social structure (Valero, 2023). It leads people to believe that only God or luck can change their social, political, and economic conditions (Freire, 1993; Frankenstein, 1983; Giroux, 2020a).

The dominant group always wants to maintain their sociocultural and political superiority and status quo using different state apparatuses; among them, education in general and mathematics, in particular, are the surest means of producing hegemony by concealing social injustice, cultural appropriation, political domination through the creation of meta-narrative of neutrality, commonsense, objectivity, efficiency, universality, rationality, and modernity (Apple, 2019; Brookfield, 2017). Through modern curriculum and its accompanying mechanical pedagogy, the oppressor group is willing to impart only functional literacy to practitioners to fulfill the requirements of a particular job, so that they cannot challenge social and working conditions (Skovsmose, 2007). In so doing, they use soft power—education, culture, social and economic privilege, and the accessibility of technology—to hegemonize the oppressed group by creating a false conception of education (Freire, 2005; Habermas, 1972).

The false conception of education pertains to technically informed pedagogy. It is fundamentally related to control, management, and exploitation (Habermas, 1972). The control is in the sense that students have not been involved in selecting learning experiences and pedagogical activities. They are urged to follow teachers' instructions without question. It is a condition of armed sympathy to students for their learning (Freire, 1993). Students' interests, emotions, and willingness are rarely addressed. It exploits students' learning potential by imposing pre-packaged knowledge. Technically informed pedagogy incorporates a deductive/axiomatic approach in teaching-learning activities that focuses on disseminating compartmentalized knowledge to students at specified times, which seems meaningless and irrelevant to learners (Kirylo, 2013), supporting the development of a magical/naïve consciousness (Freire, 2005). In this

context, I have captured the essence of the above discourse on pedagogy through the following poem.

Transmissionist pedagogy impairs students' eagerness,
But the informative comfort zone makes it pervasive.
Youths eager to take an innovative/imaginative flight,
Pedagogy eclipses students' potentiality by dimming the light.

Linear reductionism spoils students' willingness,
But an analytic piecemeal strategy brands its omnipresence.
Teacher as a sage, a strict, rigid, and technocratic guide,
Students' curiosity and enthusiasm are pushed aside.

Students dread deductive reasoning, theorems, and proofs,
But modern mathematics thrusts and imposes the same.
Suppressing students' lived experiences kills their zeal,
Decontextualized content dominates students' appeal.

Mugging bookish information erodes students' creativity,
But neoliberal school structure delights in its superiority.
Dominating native ways of knowing by blaming them as absurd,
Pushing learners far from lifeworlds and voices unheard.

Hovering ghost of irrefutable truth imprints Westernism,
Preparing organic intellectuals who enjoy its presentism.
Inculcating ahistorical, apolitical and acultural doctrines,
Flourishing magic/naïve consciousness as the ultimate.

From the above poem, narratives of my critical participants, and my experiential experiences as an insider of the mathematics teacher educator of Nepal, I have perceived that our mathematics pedagogy from schools to universities has supported shaping the mindsets of future teachers (learners) in such a way that teaching is nothing but solving the bookish problems. It has reinforced the blind faith or myth towards other aspects of social, cultural, historical, and political settings. These are all neutral outcomes of the systems, and we need to obey them without questioning, which may instigate socially unjust practices.

Pedagogy as/for Confirming Social/Epistemic Injustice

Reflecting on my academic journey, I realize that ME unambiguously promotes the formalist view of mathematics, which describes it as a paper-and-pencil formal game played with mathematical symbols. Its truthiness depends upon whether

it follows specific rules and logic precisely. I found that most of the content in school Arithmetic, Geometry, and Statistics could easily relate to real-life problems; however, it is mostly presented in isolation, except for basic Arithmetic calculations. I was trained to search for a single correct answer to the bookish questions. Most of the questions in the textbooks were imaginary; that is, they were not derived from real-world situations (Figure 2). It had created some confusion in my childish mind that mathematics is a discipline that rarely discusses our social, cultural, and daily-life problems, and thus emerges the images of mathematics as the meaningless or lifeless games of symbols, formulae and abstract ideas (Lamichhane & Belbase, 2017). It creates mathematical othering in which students do not recognize mathematics as their own subject (Abtahi et al., 2020). In this regard, I have sought to reflect on my experience throughout my academic and professional journey, which illustrates pedagogical practices in mathematics.

Mathematics class,
Dance of symbols
Pile of formulae
Imprint of theorems
Blindness to history.

Mathematics class,
Certainty of facts
Confirming knowledge
Abstraction of ideas
Ignorance of culture.

Mathematics class,
Replication of the algorithm
Consociating irrefutable truth
Mastery of contents
Discarding social reality.

Mathematics class,
Uniqueness of method
Generalizing concept
Glorifying foreign knowledge
Devaluing local knowledge.

Mathematics class,
Disparity of priority
Invasion of the English language
Diminishing local language
Revering power centers.

Mathematics class,
Naturalizing/neutralizing oppression
Promoting the hidden interests of the oppressor
Barricading on local ways of knowing
Restricting discussion on the unjust practice.

Mathematics class,
Masking unethical hierarchy
Maintaining the status quo
Suppressing learners' voices
Magnifying social and epistemic injustice.

In line with my view, Pawan narrated his pedagogical experience and its possible consequences for students' lives, in particular, and social lives in general. *In my opinion, in ME (particularly in mathematics pedagogy), what should have happened has not, and what should not have happened has. We could not create an engaged learning environment in which students and teachers simultaneously participate in the learning process. Schools or universities have created multilayered hierarchical power centers that have not facilitated meaningful learning environments. There is no harmony among stakeholders—policy makers, curriculum designers, textbook writers, teachers, and students. It seems to be governed by bureaucratic thinking, in which those in senior positions control educational institutions and shape educational policies, curricula, and mechanisms of schooling. It is unfair to blame teachers for not doing this and that. They are not autonomous in implementing their pedagogical activities. The system has many problems, but we seek solutions in teachers' pedagogical activities. Teachers are circumscribed by educational policies, curricula, textbooks, and evaluation processes, to name but a few.*

Educational settings do not allow teachers to connect their teaching and learning activities to real-world problems because they are always under pressure to complete pre-designed courses within a stipulated time. Even though I am aware of

the prevailing deficit in teaching and learning in schools and universities. I have not been able to transform my pedagogy to develop learners' agency by integrating social, cultural, and political issues. I have realized that those in power want to control the system so that no one can challenge or disrupt it. If not, why are the concerned authorities not eager to integrate social, cultural, and political issues into mathematics curricula and pedagogy? It is not a difficult task to do so. Let me give some examples of how we can integrate social, cultural, and political issues in ME without burdening the learners.

You (indicating me) are familiar with the secondary-level school mathematics curriculum. There is a chapter on profit and loss. We teach this content based on bookish questions that seem far removed from real-world problems. There are many incidents or events in which we can easily relate the contents of profit and loss to our classroom; however, we have failed to do so. For many years, the peasants of the Chitwan district have organized protest rallies to demand fair prices for their products (See Figure 11). In this context, incorporating these incidents into classroom discussions on profit and loss would certainly provide a contextual understanding of the concepts. But it has not happened to date in a mathematics classroom. Why do the farmers organize the rallies? How much is the cost of production? What are the present market prices of the goods? Is there any gap between the cost of production and the market prices of the goods? Who is the sole agency that determines the price of agricultural products? Why do farmers not have the right to determine the price of their products? Does external authority determine the prices of other industrial products?

Figure 11

Peasants' Demonstration for Fair Price

At this point in our discussion, I have to share another significant issue that contributes to the instigation of social discrimination in mathematics classrooms. You (indicating me) must include language issues in your dissertation. It is one of the most

significant issues that creates hurdles in our educational settings. Approximately 130 languages are spoken all over the country, but the medium of instruction is either Nepali or English. The Constitution of Nepal, 2073 B.S (Bikram Samvat), guaranteed the right to primary education in the mother tongue; however, this has not been effectively implemented due to a lack of textbooks, trained teachers, government financial support, etc. Likewise, English as a medium of instruction in private schools and universities has demoralized and marginalized students. They are not allowed to participate in discourse or share their learning experiences in their native languages. The notion of speaking English has been violently established as the norm of academic and professional excellence and social prestige. Many developing/developed countries—China, Japan, South Korea, etc.—have achieved academic excellence and economic prosperity without adopting English as the medium of instruction in schools and universities. Why do we need English? There is a big question: do we need mathematical knowledge, concepts, skills, or the English language? Why do we put extra burdens on our students? It is the unjust practices in schools and universities that restrict students' right to learn in their mother tongue. In conclusion, I felt that ME has failed to enrich the creative, innovative, and critical thinking and actions for ensuing social transformation by enhancing the agendas of empowerment and inclusiveness; instead, it imparts instrumental knowledge and skills that conceal these attributes, resulting in unjust practices.

Likewise, Chandra has expressed his views on the contemporary pedagogical practices in ME. *Besides discussing many pedagogical principles, learning theories, and psychological models in our universities, they have not been reflected in mathematics classrooms. It might be an ethical issue as a university teacher, especially regarding how transparent I should be. I will try to be as transparent as possible. Our pedagogical practices have gradually become more mechanical and instrumental than in previous years. Now, it has been limited to solving the questions included in the 'Old is Gold' (a book of a collection of prior examination questions) and the 'Guess Paper' (a book of a collection of questions and answers that would have a high possibility of being included in the upcoming final examination). Actually, we rarely engage in academic or professional activities. We create an illusion of pedagogical activities, and the university has justified this by providing certificates. It seems somehow radical, but it is a ground reality. Due to the overemphasis on*

imparting bookish knowledge into students' heads through an instrumental approach, students' epistemic diversity is doomed.

We have lost everything; nothing remains to us. We lost our history, educational system, epistemology, languages, and identity, and now we are no more than objects. In my opinion, our pedagogical approach promotes a culture of exclusion by devaluing local knowledge and native ways of knowing, ultimately reinforcing Western-Eurocentric views in ME, a product of colonial/imperial intent.

From the above narratives, I have concluded that pedagogical practices in ME have not considered historical, cultural, and social inequalities, nor epistemic injustice. I do not claim that mathematics education is a panacea for all forms of social/ epistemic injustice, but through mathematical pedagogy we can raise awareness of social/epistemic injustice. Most teaching and learning activities in mathematics have prevented students from learning about their societies, cultures, and ways of life. It further encompasses views of mathematics as ahistorical, acultural, and asocial (Lamichhane & Luitel, 2023a; Lerman, 2000; Luitel, 2009), which again sheds light on other aspects of mathematics as an integral part of our lifeworlds.

In this connection, let me explore how pedagogical practices unwittingly contribute to socially unjust practices. I remembered one incident in school mathematics in which we were taught to find simple and compound interest, as well as the total (compound) amount. We had been given the mathematical formulae for finding the simple and compound interests as $\frac{P\,T\,R}{100}$ and $P[(1+\frac{R}{100})^N - 1]$, respectively, where P = principal amount, T = time of investment, R = annual rate of interest, N = number of compounding periods, and urged to fit the formulae to find the required answer without consideration of their relation with real-life situations. Who offers compound and simple interests? What are the impacts of compound interest on society? Why do we need compound interest? These are some of the unanswered questions during classroom teaching and learning activities.

We have been compelled to use the formulae to obtain the correct answers. I did not know whether our mathematics curriculum demanded only algorithmic skills or the teacher lacked pedagogical skills to connect formal mathematical knowledge with real-world problems. Whatever the reasons behind it, the ground reality was that the educational system in general and ME in particular unwittingly contributed to the neoliberal agendas (Forbes, 2017), a mutational form of colonialism in the 21st

century, because without connecting social, cultural, and political settings, it is difficult to develop critical thinking in students, and then they become unaware of its long-term effect.

Moreover, an isolated pedagogy conceals social evils because it pushes students to the role of recipients, preventing them from participating in critical discourse by bringing their social and historical practices into the classroom. Learners become bystanders of social injustice. If ME develops students' creative and critical thinking, they can challenge and resist the persistent practice of compound interest (Meter Byaj) in their society. Due to the over-emphasis on the instrumental understanding and mechanical literacy in our educational system, in general, and in ME and its pedagogy in particular, we unwittingly become eyewitnesses to the loan-sharking victims' protest rally in the capital city, Kathmandu, to put pressure on the government to resolve the issue. It is one of the disgraceful events of the third decade of the 21st century, in which government, civil society, educators, researchers, politicians, and other stakeholders become shameless spectators of the protest rally, sitting on the sidelines (see Figure 12).

Moreover, the government of Nepal and its line agencies ignored the plight of loan-sharking victims until the date of the street strike. It signifies the state's intention to create a socially just and democratic society and nation. It is not only the case of the moneylender; Nepali Banks have also charged compound interest on their investments in the name of exceeding the due date of installment to be paid. However, we can observe rare instances in which educators and students have resisted such practices through their pedagogical practices. After the COVID-19 pandemic, some of the industrialists, traders, entrepreneurs, farmers, etc., who are victimized by high rates of interest and the rule of compounding the interest after a certain period of time staged a protest rally to uncover practices of compound interest charged by Nepali Banks to their debtors (Figure 13). In my opinion, it is another form of exploitation in the disguise of state statutes and legislation. However, it could not be

Figure 12

Loans-sharking Victims' Protest in Kathmandu

File: Loan shark victims duped by the local meterbyaj system stage a protest in Kathmandu

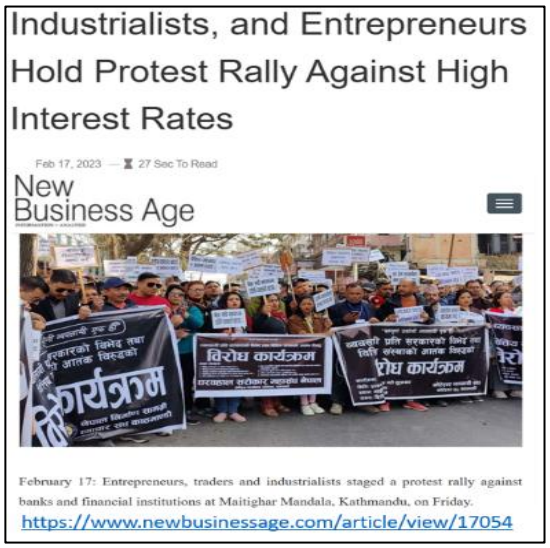
discussed in our mathematics classroom. In this regard, my argument is that modern mathematics lacks a critical orientation, it has continuously sought to avert the incorporation of critical pedagogy in ME, thereby supporting the indoctrinating neoliberal agenda in education (Forbes, 2017).

The neoliberal agenda focuses on competition, efficiency, and individual effort, in a market-driven corporate ethic in which profit and consumption are central. Neoliberalism regards education as a means to enhance competition in a global economy in which individualism conceals public interests, competition casts shadows on cooperation and collaboration, and consumerism engulfs communalism and renders the quality of education on high-stakes tests (Hursh, 2013; Demir & Keleş, 2021).

Likewise, another aspect of the instrumental literary and mechanical skills is to focus on imparting disciplinary specialism, contributing to preventing the development of critical thinking so that learners are unable to read the world critically and fail to understand the reasons and linkage behind the facts (Gutstein, 2006, 2016; Macedo, 1993). It signifies that the neoliberal agenda in education treats the individual learners as commodities, independent of social, cultural, and political intricacies, ready for sale in the free market so that they can contribute to efficiency, effectiveness, and speed of production of goods for the sole benefit of corporate business masters (Forbes, 2017).

Figure 13

Industrialists' Protest Rally Against High Interest Rates



The interests of corporate business houses and the ruling class converge to perpetuate the structure of oppression, in which the ruling class seeks to maintain its position in the state's central power, while corporate houses aim to maximize profits. Moreover, these two parties simultaneously support each other, each with hidden interests in domination and exploitation. In so doing, they use the state apparatus to prepare educational policies and create the meta-narratives of education as a tool for developing efficient human resources necessary for a globalized marketplace. It is because of the fear of the possibility of disturbance in the regime of their oppression

and domination. To avoid such turbulence in their regime, the oppressor groups aim to prevent the development of creative and critical thinking in students and thus orient educational activities towards enhancing instrumental understanding (Valero, 2023). ME curriculum and its accompanying pedagogy do not consider the real-world problems, students' diverse backgrounds and experiences leading to the disengaged mathematical activities that not only hamper the success of marginalized groups in mathematics (Abtahi & Battell, 2017) but also reinforce existing power dynamic and inequality that are further underpinning the social discrimination, stratification, exclusion, and unjust practices (Gates & Jorgensen 2009; Vale et al., 2016).

To continue unjust practices in society and the nation, the ruling class, backed by corporate houses and international financial institutions—WB, IMF, USAID, ADB, to name a few—uses the state apparatus, in which schools and universities become the surest means (Regmi, 2023). I have realized that the interest of the ruling class to protect their regime of control and exploitation and the hidden interests of subjugation and subordination of neocolonial power centres conflate to indoctrinate their worldviews—perspectives, values, language, and practices for confining the people of disenfranchised countries in the global south as uncritical and honest consumers of their products (Paraskeva, 2021). The colonial power centres have understood that it is necessary to prevent critical, creative, and imaginative thinking in education so that people from the global south can easily accept their metanarratives and myths of selfless financial aid and technological support for the modernization of education.

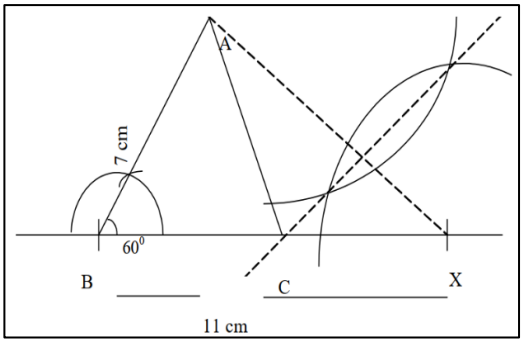
Nepali mathematics educators and researchers (Dhakal, 2019; Lamichhane & Luitel, 2023a; Luitel, 2009, 2017; Pant, 2015; Shrestha, 2008) have ventilated their disagreement that pedagogy in ME has suffered from a deficit of Western-Eurocentric worldviews that compel the practitioners to enjoy and celebrate dominating onto-epistemic practices, while ignoring and condemning their own knowledge, skills, convictions, and ways of knowing. Likewise, Dhakal (2019) argues that negative beliefs, attitudes, and images of mathematics are the product of Western domination in ME. Such a conception of teaching has been inculcated in teachers' mindsets through the prolonged implementation of technically informed curricula, in which teachers are assigned simple routine or clerical duties (Grundy, 1987; Lamichhane & Luitel, 2022). The imprint is that Nepali students have experienced different forms of epistemic injustices in mathematics classrooms.

An epistemic injustice arises from distinct sources of maltreatment of learners based on their capacities as potential epistemic agents (Fricker, 2007). The first and foremost pedagogical practices in mathematics experienced by Nepali students are the rejection of students' potential to share their understanding and contributions to mathematical knowledge, owing to identity prejudice. Students have been given improper credibility as learners (Crawford, 2021; Fricker, 2007; Wanderer, 2012). It evolves from the lack of appropriate recognition of speakers (students) as epistemic agents by hearers (teachers and other concerned authorities). In most classrooms, students are blamed for being too unintelligent to learn mathematics, and teachers have pointed to them as the primary cause of underachievement and failure (Thapa, 2016).

We can rarely believe that students are sometimes penalized for offering creative solutions that differ from their classroom practices (Mathema & Bista, 2006). It is worth noting that the examiner assigned zero marks to the student's answers to a particular question, which is absolutely correct. The question concerns the construction of a triangle with a given base, a side, and an angle between them. The examiner allocated zero marks to the student because it was solved differently from the marking scheme provided to the examiners (Figure 14). This reflects teachers' views of students. They might think that students lack creative power; they can simply imitate, collect, and recite the given mathematical information and knowledge, and that teachers are the sole authority to teach them and are the only authentic source of knowledge. It is akin to testimonial injustice, as described by scholars involved in the genre of epistemic injustice (Fricker, 2007; Pohlhaus, 2017; Tanswell & Rittberg, 2020).

Figure 14

Right Construction by Students



(Mathema & Bista, 2006, p. 56)

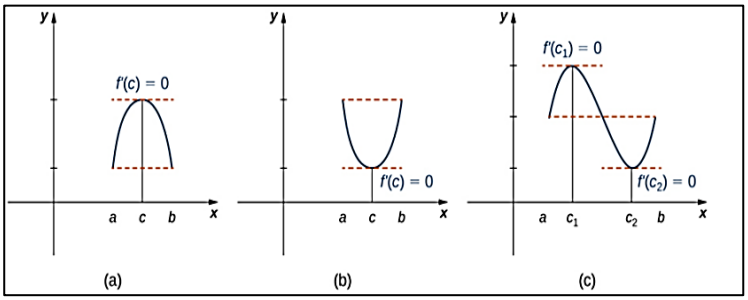
Highlighting the effect of testimonial injustices in education, Fricker (2016), who started the sustained discourse of epistemic injustices in academia, argues that "testimonial injustice not only blocks the flow of knowledge, it also blocks the flow of evidence, doubts, critical ideas and other epistemic inputs that are conducive to knowledge" (p. 162). It signifies that epistemic injustice is related to, and grounded in, the power and ethics of knowing and doing. Testimonial injustice seems to occur

within an individual domain, in which exclusion from sharing and contributing to knowledge occurs because of identity prejudice on the part of listeners (Tanswell & Rittberg, 2020). It disrespects the personal capability and potentiality concerning his/her status as an epistemic subject in which various forms of power, prejudice, and oppression are in play. In my opinion, an identity prejudice on the part of the hearer is not only an individual construct; it arises in the conglomeration of the structural, cultural, and lingual, to name a few, that create epistemic injustice in academic discourses by owing identity prejudice in the collective hermeneutical resources, labeled as hermeneutical injustice (Fricker, 2007; Goetze, 2018).

Hermeneutical injustice occurs in ME, where learners' lived experiences are not acknowledged as significant for pooling knowledge and concepts for collective hermeneutical interpretation. In this connection, Fricker (2007) explains that hermeneutical injustice manifests when "someone has a significant area of their social experience obscured from understanding owing to prejudicial flaws in shared resources for social interpretation" (p. 148). It illustrates that hermeneutical injustice is at play in ME when pedagogical practices prevent marginalized individuals or social groups from bringing their experiences into mathematics classrooms as epistemic resources. Those who hold arbitrary power interpret the lived experiences of marginalized groups and individuals through colonial frameworks and claim the uniqueness and ubiquity of their ways of knowing, doing, and interpreting (Maringe & Chiramba, 2023). When enacted in academic institutions, the hermeneutical injustice prevents marginalized learners and social groups from authentic and agentic participation in learning. Students from different cultural groups have some experience with mathematics, but formal pedagogical activities have not been endorsed as resources for authentic learning experiences. We have seen different types of curves in our society and culture; however, in our mathematics classroom, most examples are imaginary (i.e., not related to real-world problems).

Figure 15

Illustration of Rolle's Theorem



For example, I remember the Calculus class of the B.Ed. second year in 1996 at TU, where I had to prove Rolle's theorem. The statement of the theorem is: *A function f is (i) continuous in a closed interval [a, b], (ii) deferential in the open interval (a, b), and (iii) f (a) = f(b) where a and b are real numbers, then there exist at least one real number* $c \in (a, b)$ *such that* $f'(c) = 0$. *Teacher drew some figures to illustrate the concept of Rolle's theorem (Figure 14). Meanwhile, I asked some questions. Sir, where does a curve exist in our daily lives? How do we construct the functions with the help of real-life examples that trace such curves? What are the equations that represent the curves you have drawn? The first and second curves resemble 'Doko,' resting in downward and upward positions. Immediately, teachers replied that it was not a place to discuss household utensils or materials. Some said it is like Kachaura (Bowl), others said Ghanti (Bell), and so on. We do not consider all of these materials because they lack uniform shapes that can represent specific functions. We intend to prove the given mathematical statement through precise mathematical definitions, axioms, and prior theorems.*

This narrative explores the ground realities of the mathematics classroom and the conception of teachers as well. Here, my intention is not to blame the respected Guru (teacher), but to show how Western modern mathematical practice shapes our mindsets, in which mathematical content, theorems, and even algorithms must have rigorous, uniform structures that can be easily generalized. It is a kind of hermeneutical injustice. One cause of hermeneutical injustice is a pedagogical approach that fails to connect students to the conceptual tools needed to make sense of mathematical ideas. It is a process of wrong infliction on GSTR people in their capacity as epistemic agents (Crawford, 2021; Fricker, 2016; Pohlhaus, 2017). Axiologically, it pressures the practitioners to accept the ideology of certainty and universality of Western-modern mathematics. Ontologically, it regards mathematical objects as pure, divine, decontextualized, and incorrigible. Finally, its epistemological position rests on objective knowing by incorporating hypothetical-deductive, linear reductionism, and dualistic rationality (Luitel, 2017). They enforce objectification of agentic subjects, resulting in epistemic injustice (Fricker, 2007).

During the objectification of agentic subjects, English, as the language of instruction in mathematics classrooms, plays a significant role (Tanswell & Rittberg, 2020). At a glance, the language of instruction seems to be a means of communication; however, it is not a neutral endeavor. Moreover, English as the medium of instruction,

which is instigating in the name of modern education, not only disrupts the learning process in their home language but also disqualifies their social experiences (Phyak, 2021; Santos, 2014), thereby hindering cognitive development. Disqualifying native language inheritance within a particular society masks cultural testimonio and/or culture-specific terms, concepts, and knowledge that are very difficult to find an equivalent for and thus are untranslatable and extinct (Kashgary, 2011). It is one of the best ways to exert pressure to assimilate into other cultures, which fuels the loss of local decision-making capacity and self-sufficiency (Maffi, 2001). In the context of Nepal, the native or first language faces the threat of extinction through the Nepali or English-only policy of instruction (Awasthi, 2004; Rai, 2018), which is forced relocation through the boarding schools, establishing the norms of speaking English as the social prestige and academic standards underpinned by neoliberal educational policies (UNPFII, 2016).

The neoliberal political economy and its globalized, market-dominant strategy have raised a small number of culturally dominant languages and exacerbated threats to native or first languages (UNPFII, 2016), thereby leading to the homogenization of cultural diversity (Maffi & Woodley, 2010). Likewise, the dwindling of linguistic diversity not only assassinates local culture, knowledge, and practices but also poses significant threats to biodiversity, because local knowledge, concepts, and skills are more relevant to maintaining biodiversity than the Western-Eurocentric approach (Maffi & Woodley, 2010; Skutnabb-Kangas, 2009). In this context, I have come to believe that the language of instruction in education is explicitly or implicitly related to colonial practices. It perpetuates linguistic imperialism, creating a strong foundation for the massive destruction of epistemic diversity.

Dominant groups do not allow marginalized learners to interpret their significant sociocultural and historical experiences and to take the privilege of their own interpretations over those of dominated groups (Maringe & Chiramba, 2023; Santos, 2014). It is an epistemic violence that was inflicted by colonial power during the period of colonialism. Epistemic violence supports epistemic imperialism, in which dominant groups not only interpret the experiences of oppressed groups but also speak for those groups, thereby imposing meanings on them and perpetuating epistemic hegemony and imperialism through the use of dominant epistemic resources (Nikolaidis, 2023; Paraskeva, 2016). The hidden interests of the epistemic injustices endorse passivity, objectivity, and silence in the learners that distract them from the

root causes of oppression so that the ruling class can continuously get consent without any resistance, a form of hegemony (Gramsci, 1971), further helping to conceal the present crisis of the society, nation, and the world at large.

Pedagogy as/for Concealing Glocal Crises

The pedagogical execution in ME could not be isolated from the goals of ME, the curriculum, and teachers' worldviews towards mathematics (Ernest, 2008, 2012). Teachers are not autonomous. They execute externally prescribed curricula and orient their activities to meet normative standards. It means that pedagogical activity, on its own, has not significantly altered ME programs; however, it consolidates mathematics activities with real-world problems that might energize learners to engage in mathematics learning. It can create a learning environment in which teachers and students simultaneously engage in mathematical discourse and possibly unearth the relationship between formal mathematics and real-world problems. I have experienced that mathematics pedagogy has not broken the boundary of informing pedagogy in which mathematical facts, knowledge, and concepts are poured into students' empty minds (Alam, 2013; Freire, 1993), concealing the present glocal crises of society, nation, and the world. It is very difficult to establish the explicit connection between mathematics and the glocal crisis because it is hidden and operates as a guiding principle behind the scenes. We need a critical gaze to explore hidden attributes that shape our ME. In this connection, I have sought to capture how ME pedagogy implicitly/explicitly contributes to concealing glocal crises by diverting our attention from real-world problems.

Mathematics pedagogy,
instructs us to compute but not to care
trains us to manipulate but not to comprehend
convinces us to compete but not to cooperate
urges us to conform but not to challenge.

Mathematics pedagogy,
provides a tool but not a lens
solves the question but not the problem
recommends the rule but not a principle
informs the facts, but not the meaning.

Mathematics pedagogy,
permits us to reproduce but not to recreate

advises us to drill but not to engage
pacifies us to receive but not to energize
pushes us to rote but not to learn.

Mathematics pedagogy,
provokes us to test but not to explore
inspires us to individuate, but not to socialize
drives us to disdain but not to adore
prompts us to exploit nature but not to nurture.

Mathematics pedagogy,
induces instrumental rationality but not wisdom
makes us spectators of loss of diversity, but not agentic
incites us for individual profits, but not prosperity
conceals glocal crises but does not exhume and resolve them. `

In a similar vein, Surya contentiously presents his arguments regarding pedagogical practices in Nepal. *As I stated in our first conversation, ME is not grounded in our soil, culture, and history. It results from unnecessary foreign influences from the beginning of so-called modern mathematics. Because of the lack of groundlessness in mathematics with our soil and nature (immediate environment), we feel a weak sense of connection to our soil, culture, and history. It supports emerging and expanding alienated views of mathematics as an acultural, asocial, and ahistorical endeavor that ultimately reflects on our mathematics curriculum, pedagogy, and assessment. The major effect of foreign influences on mathematics pedagogy is that we fail to incorporate local issues that have great potential to develop critical and creative thinking in mathematics, which ultimately enables learners to be change agents rather than spectators of social, political, and cultural wrongs/good. I think it is the most important point to consider in rethinking our mathematics education towards our own perspectives.*

Likewise, another significant failure of ME is that we have not brought local issues in mathematics classroom. Primarily, pedagogical practices have focused on preparing the test. In mathematics education courses at the Bachelor and Master levels, we teach statistics—regression, correlation, trends lines, estimation, hypothesis testing, forecasting, etc. We often deal with imaginary/hypothetical data (lacking empirical grounding and disconnected from real-world problems), in which students

fails to connect the knowledge and skills they acquire to their immediate environments (see Figure 3) We did not or do not orient our activities to draw the trend lines of the depletion of natural resources such as lakes, rivers, ponds, and forests, to name a few over time. For example, let's take the ***Bagmati River****, a historically and religiously sacred river. The holy temple of Pashupatinath, a UNESCO World Heritage Site, is situated on the banks of the river. People revered their God/Goddess by offering water drops after being purified by taking holy baths in the river. But now, the river water is highly contaminated. We cannot see a current of freshwater in the river. It looks like a drain on the city. The river seems to be covered with plastic, sewage, household garbage, and industrial byproducts. It is very difficult to see the aquatic life in the river (Figure 16). We are no more than spectators of the river's extinction, the major lifeline of the Kathmandu valley, the capital city of Nepal. It creates an ecological imbalance in the valley, threatening human and non-human lives. Unfortunately, we have not considered potential thematic areas of formal mathematical education discourse in schools and universities. In this regard, we can argue that our education, in general, and ME in particular, prevents the students from engaging with issues of biodiversity, ecology, environmental degradation, etc. That is, mathematics pedagogy does not consider the world's current burning issues—biodiversity loss, environmental degradation, habitat loss, ecological imbalance, deforestation, to name a few. Sometimes, I felt that ME and its stakeholders (teachers, curriculum designers, bureaucrats, and other concerned authorities) are indifferent to current issues that may have local and global impacts and possibly induce glocal crises.*

Figure 16

Status of the Bagmati River

Gettyimages (2025)

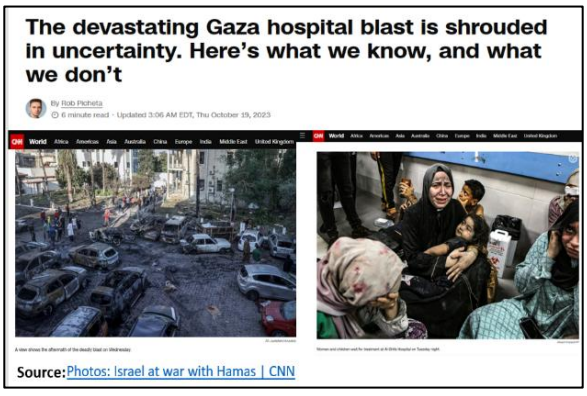
When discussing pedagogical practices in ME, Chandra radically expressed his discontent in the following ways. *I mentioned earlier in our discussion that, if we deeply contemplate ME in general and its pedagogy in particular, we find that it is no more than a technical reproduction of mathematical facts, concepts, and theorems that rarely contribute to the development of creative and critical thinking. Do you know why I made such a claim? Creativity and criticality cannot be fostered by placing pedagogy within a narrowly conceived view of learning as the imparting of bookish*

knowledge to prepare students for tests. It restrains students from the routine problems. They are somewhat familiar with abstract and pure mathematical knowledge, including technical terms, definitions, axioms, and theorems presented in textbooks. Indeed, solving textbook problems is necessary but insufficient to develop an eagle-eye view toward a glocal perspective. We need to develop creative, critical thinking, and life skills by connecting mathematics pedagogy to the world's current crises—biodiversity, air pollution, deforestation, melting glaciers and mountains, ecological imbalance, drought, famine, war and violence, and many more —so we can resolve them wisely. We have not raised the issue of global crises in ME, but we habitually teach abstract and pure mathematics.

As a student and mathematics educator, I have found that ME courses cover a wide range of topics in Algebra, Trigonometry, Vectors, Calculus (Derivatives, Anti-derivatives, Differential Equations), Topology, Real and Complex Analysis, Euclidean and non-Euclidean geometry, Numerical Analysis, Statistics, etc. Most of them focus on deriving theorems and solving abstract, bookish questions; some are too long and tedious. However, there are rare problems in real-world contexts help students understand their meanings and applications. We have not yet brought up the issues of global warming, loss of biocultural diversity, and violence and war faced by human civilization in a mathematics classroom, even though mathematics can picture these crises.

Figure 17

Violence of War



We have seen wars in Afghanistan, Turkey, Ukraine, and Palestine within the last decade and their impacts on different sectors of the world. How much are the expenses of the wars? How many casualties are there in the wars? How many school-aged children are restricted from education? Can you imagine it? Who is responsible? Can ME picture the cries? Can ME and its pedagogy make the young generation aware of the devastating economic, physical, and psychological effects of worldwide wars? Why do mathematics educators, mathematicians, curriculum designers, and other concerned authorities remain silent and indifferent regarding the issues of wars, biocultural diversity, environmental

degradation, and global warming? Many school-aged children do not have access to education, and those who have access to education are restricted from getting quality education due to the lack of appropriate resources; however, the powerful countries spend trillions of dollars on war. Is it not a crisis worldwide? I have realized that power is at the center of all these questions; no one can speak and challenge the powerful. It is because we have not been taught to challenge authority but to obey, accept, and accommodate. Moreover, we have been taught that questioning and challenging authority and the system can bring havoc to institutions, societies, and nations. Those in favor of the present education system argue that these are political issues and not the business of mathematics educators. We were trained to believe that ME must be silent and neutral in sociopolitical and cultural issues.

Astoundingly, those in power inflict war on the less powerful to advance their sociopolitical, economic, and military agendas, as well as their education systems, national and international security, trade and business, and many other areas, all of which are unethical and harmful activities. But when we discuss the negative consequences, it becomes unethical and political, disrupting the systemic functioning of societies and nations. How do you think about these issues? I believe it is a hidden strategy of the neoliberal political-economic system of powerful nations. They are always interested in subjugating the less powerful nations through soft power (education, economic policy, trade and business, technology, etc.). Basanta ji! In our previous talk, I argued that ***we lost everything and nothing is left with us;*** *that is enough to indicate every kind of oppression enacted on us. Honestly, I have felt that ME has become a silent sideline spectator to local and global crises rather than an active player in resolving these issues.*

I have captured the two types of crises from the above narratives. The first is related to the pedagogical approach that seems to dislocate from the soil, history, worldview, and ways of knowing that support perpetuating the beliefs that mathematics is apolitical, ahistorical, asocial, and acultural. It restrains mathematics far from the lifeworld of the people, and thus learners are not willing to take ownership and authorship of the learning. The second crisis relates to glocal scenario in which mathematics has not been oriented toward enriching critical knowing, cultural self-knowing, and ethical and visionary knowing (Taylor & Taylor, 2019).

In our practices, mathematical activities based on *Pramana* differ significantly from Western ways of knowing and proof. Mathematical practices in the Indian

subcontinent accepted the notion of *Pramana* as empirically manifest (Pratyaksa) ways of establishing mathematical truth, from the time of the *Sulba Sutra*, when mathematics is regarded as a practical rather than an idealized (religious) concern (Raju, 2007). For example, we take our measurement system of length, which generally starts with *Angul* (eight grains of barley placed evenly) and then *Vitta (five Angul), Haat (two Vitta), and Tanga* (four/five Haat) (see Figure 9). These practices have been discarded by blaming them as being inconsistent. It is because modern mathematics celebrates two-valued logic that discards all other forms of reasoning and logic. Likewise, we can take an alternative logic of *Syadavada* of *Jainism.*

The word *Syat* means "maybe" and "perhaps." It indicates that *Syadavada* means perhaps-ism, or may-be-ism, which opens up to alternative interpretations and meanings rather than confining it to the restricted two-fold meaning of either this or that. The *Syadavada* of *Jain*ism is associated with *anekantavada,* which discards the meaning derived from a single point of view and offers learners the opportunity to generate multiple meanings relevant to their times and context. The crux of the *Syadavada* is that certainty is not possible, and uncertainty requires profound judgment (naya) of the phenomenon from the different points of view emerging from context, time, actors, and place (Raju, 2007). As mentioned by Raju (2007), the *Syadavada* is based on the seven-fold judgment *(saptabhanginaya)*—

> (1) *syadasti* (may be it is), (2) *sydtnasti* (may be it is not), (3) *syadasti ndsti ca* (may be it is and is not), (4) *syadavaktavyah* (may be it is inexpressible [indeterminate]), (5) *syadasti ca avaktavyasca* (may be it is and is indeterminate), (6) *sydtnasti ca avaktavyasca* (may be it is not and is indeterminate), (7) *syadasti ndsti ca avaktavyasca* (may be it is, is not, and is indeterminate). (p. 82)

Likewise, Buddhist philosophy rejects the permanent notion of certainty. Buddha described four wrong views about the world: "the world is finite, the world is not finite, the world is both finite and infinite, and the world is neither finite nor infinite" (Raju, 2007, p. 84). These two dialectical thoughts suggest that to understand any events, lives, or selves, it is necessary to explore them in multidimensional ways. I have come to realize that the world cannot be described solely through a dualistic view that celebrates simplistic, determinist, reductive, and linear relationships (Davis & Simmt, 2014). Moreover, *Nagarjuna* (a second-century Madhyamika Buddhist philosopher) also put forward the view that "everything is such, not such, both such

and not such, neither such nor not such" (Raju, 2007, p. 85). It is a non-essentialist view that rejects the self-existent nature of reality and illuminates its impermanence, fluidity, and dynamism. It goes beyond the worldly categories of ideas, concepts, and things and acknowledges the concept of dependence co-arising (Westerhoff, 2009).

Most of the native people of Nepal, admire and worship nature—the Himalayas, rivers, lakes, ponds, hills, trees, and living creatures—snakes, birds, dogs, cows, and many more—appreciating their roles in their lives. They have knowledge, concepts, and skills to connect with nature and spirituality, and to use natural resources more sustainably. These practices help build ecological integrity. People have considered the earth their home and nature as a god/goddess that provides energy for their lives (Pretty et al., 2009). In this connection, I want to argue that the detachment of ME from ecological and cultural diversities restrains students from being aware of and mindful of the varying degrees of anthropogenic effects and their devastating consequences on human and non-human lives and the health of the Earth.

The second issue related to global impact of modernism/colonialism through the prolonged enactment of neoliberal political economic system that imbued the concept of nature as an object to be exploited for the luxurious life of people, particularly western people (Valero, 2023) that create anthropogenic stresses on the earth and threaten human civilization and the ecosystem services such as ecological breakdowns, environmental degradation, declines in biodiversity and cultural diversity loss **(**Jimenez & Kabachnik, 2023).

The colonial mindset exercising unfettered capitalist endeavor through neoliberal globalization, industrialization, modernization, and neoliberal education causes devastating effects on biological, cultural, and linguistic diversity. Neoliberal thinking emphasizes competition over cooperation, the individual over the public, disdain over admiration, profit over service, power over recognition, control over autonomy, to maintain the status quo and exploitation (Khaksar, 2020). The consequence is that human civilization and/or the life of the living earth today faces multiple challenges, including, but not limited to, large-scale ecological problems, climate change, loss of biodiversity, and depletion of natural resources (IPCC, 2022).

In this connection, Luitel (2022) expresses his discontent with current ME practices by asking why we are teaching factorization at a time when the planet is getting hotter every year. He indicates that ME fails to design a curriculum that can foster inter- and multidisciplinary knowledge, concepts, skills, and pedagogy that help

break the boundaries of technically informed pedagogy and a narrowly conceived metaphor of ME as/for harnessing disciplinary skills that orient to cramming and solving routine bookish problems.

In this regard, describing the nature of modern education perpetuated by the colonial power centers, many educators (Apple, 2019; Slattery, 2006; Valero, 2023) argued that the present crises of the world—terrorism, violence, climate change, drought, famine, to name but a few are the outcomes of the unfair, uncritical, and monolithic education system. They made such claims because the monolithic education system, curriculum, and pedagogy focus solely on developing students' technical skills. At this point in the inquiry, I have realized that mathematics pedagogy has not been able to address the global and local crises; instead, it un/intentionally conceals them, implicitly or explicitly supporting the perpetuation of neocolonial presence in the GSTR through a neoliberal policy-guided sociopolitical-economic education system.

Chapter Summary

In this chapter, I have tried to unearth disempowering features of mathematics pedagogy that were implicitly/explicitly informed by the colonial remnants. These features were captured under the three board perspectives—mathematics pedagogy as/for developing magic/naïve consciousness, magnifying social/epistemic injustices, and concealing glocal crises. During my inquiry process, I have found that modernism, capitalism, neo/liberalism, neo/colonialism interlaced into complex and invisible mesh that exerted the formidable power beneath behind the scenes that created metanarratives of acultural, asocial, ahistorical and apolitical views of mathematics, thereby segregating the mathematics from the lifeworlds of the people in which their experiential knowledge, ways of knowing, and harmonious living with nature are disregarded as the most significant obstacles for modern mathematics. These views were made pervasive throughout the curriculum (see Chapter IV) and led to a pedagogy that focused solely on solving the formalist textbook mathematical problems, supporting the development of a magical/naïve consciousness among practitioners.

Mathematics pedagogy becomes a powerful tool for instigating a magical/naïve consciousness among practitioners because it prevents them from challenging, exploring, and disrupting social injustices. A more disgraceful event is that it made students, teachers, curriculum planners, and other concerned authorities

rejoice in their epistemic subjugation. Students are not regarded as epistemic and social agents, and they are urged to act robotically. Moreover, the systemic structural premises constrain pedagogy to narrowly conceived modes of transmitting a plethora of information, in which students are urged to follow instructions without raising critical questions, and teachers are trained to adopt the system. The educational institutions that support preserving and sustaining that system are defined as well-functioning educational institutions that conceal the local and global crises.

At this stage of my inquiry, I have perceived that ME practices that include the present crisis of the world, such as social/epistemic injustices, environmental degradation, biocultural losses/destructions, global warming, and many more, create a great challenge and threats to the perpetuation of different forms of injustices, exploitations, and domination. However, the colonial power centers always remain strategic in perpetuating their hubris by continuously instigating various forms of oppressive perspectives—modernism, capitalism, neoliberalism, globalization, materialistic magnification, etc.—and thus seek to conceal the glocal crises (Quijano, 2000, 2007).

In this regard, another issue is how the existing assessment system supports the spreading of the above-discussed disempowering notion of ME. The prevailing approach to assessment of learning becomes a powerful tool in the hands of colonial power centers for achieving their aims of privatization, marketization, and the thingification of education for the benefit of the minority elite in the guise of competition and efficiency. In the next chapter, I will reveal the disempowering notion of assessment, which will be further useful for understanding the detrimental effects of neocolonialism and neoliberalism in mathematical education.

CHAPTER VI
REVEALING DISEMPOWERING NOTION OF ASSESSMENT

In this chapter, I have sought to portray the disempowering aspects of assessment that I have experienced throughout my academic and professional journey. A metaphor of disempowering assessment depicts learners as objects and recipients, who must follow the prescribed curriculum and teacher prescriptions and take an externally mandated assessment. It revolves around the issues of how neoliberal and neocolonial influences shape the mathematics curriculum and its accompanying technocratic and instrumental pedagogy (see chapter V), which help instigate the unidimensional teacher-made and/or standardized high-stakes tests and vice versa, further serves the agendas of neoliberal political economy (Regmi, 2021a).

Generally, the assessment system in ME focuses on measuring the objective knowledge of mathematical facts and theorems through the paper-pencil tests that ignore the other forces—political, social, cultural, and technological that are embedded in ME, thereby blaming the learners, who are at the receiving end, entirely responsible for their failures (Torrance, 2017a). An isolated and unidimensional approach to assessing learning permeates the conception of academic and/or social hierarchy, thereby impeding collaborative, cooperative, and empathetic ways of knowing, being, and doing that un/knowingly support neocolonial and/or neoliberal agendas (Lamichhane, 2024). Likewise, it helps postulate the disciplinary egocentrism (Connor et al., 2015) perpetuated through the Western-Eurocentric view in which other knowledge, ways of knowing, being, and doing are systemically discarded by accusing them of being irrational, a lack of uniformity, inconsistency, uncertainty, and a precise structural foundation, thereby promoting the victim-blaming culture in ME.

Assessment as/for Instigating Victim Blaming Culture

I grew up in an assessment culture in school and university, in which assessment was used and still is used as a tool for labeling (ranking) the students according to their marks (grades) in tests. In my experience, these tests were/are used to blame and demoralize students for not doing well in particular content areas rather than to support and improve teaching and learning activities. In my school life during the 1980s, there were at least three tests in an academic year: terminal, half-yearly, and yearly. The terminal, half-yearly, and annual tests weigh 10%, 30%, and 60%,

respectively. These tests seemed to be summative rather than formative. They provided scores used to decide whether a particular student was eligible to upgrade to the next class. I had not received any feedback or encouragement from the teachers to improve my learning. But often I was scolded when I failed to secure passing marks or earned low marks on these tests. The sections and roll numbers had been assigned according to students' respective grades (marks). Having roll numbers at the end of the first column in the attendance register and becoming a student in section B or C is always outrageous for students. Is it fair practice in academia? Are students' marks (grades) only an indicator of their academic success?

During the 1990s, I completed my university degree (Proficiency certificate level in education (I. Ed.], Bachelor's Degree in education [B.Ed.], and Master's degree in education [M.Ed.]), in which I faced only annual (at the end of the academic year) tests. Our campus conducted the teaching and learning activities based on the prescribed curricula for a year, and an external examination was conducted by the university's office of the controller of examination at the end of the academic year to evaluate our learning achievement. We were informed of our achievement after the publication of the results through a marksheet issued by the controller's office, which was generally issued one year after the examination date. For regular students, it took approximately10 years to complete the 6-year academic program (2 years of I. Ed., 2 years of B.Ed., and 2 years of M.Ed.). As I reflected critically on the assessment systems at school and university, I found them really disempowering, in which students are blamed for being unintelligent.

When I raised the issue of assessment practices in ME during our conversation, Pawan voiced his dissatisfaction along the same lines as I have. *During my university education in the 1980s, I had no idea of the formative assessment system implemented in ME. I do not know whether other universities have such an assessment system. Most of the teaching and learning activities are oriented toward preparing for the final examination. As a resource person for the training of trainers, I have observed that most schools have engaged their children through question banks to prepare for the examination. This scenario seems more severe in private boarding schools, where there is no academic discourse but training for attempting examinations. I do not mean that an exam is unnecessary, but relying solely on it is insufficient for fostering academic growth and developing 21st-century skills.*

In fact, our students are helpless. We don't teach students to learn mathematics by relating mathematical knowledge to real-world problems so they can easily solve emerging problems. Moreover, I found that the university has trained teachers to hold the view that preparing students for the upcoming examination is the goal of teaching and learning activities. The failure of the curriculum reform movement in Nepal is due to the inappropriate assessment policy and untrained teachers, who are the primary stakeholders in implementing the curriculum reform. There are other factors as well. We cannot escape from our responsibilities by blaming others and policies. Good policies alone cannot produce the expected outcomes. For example, the continuous assessment system (CAS) appears to be a failure due to the lack of willingness on the part of concerned authorities, including teachers. A similar situation appears in the integrated curriculum of early grades (grades 1-3). Theoretically, these two policies aim to enhance teaching and learning activities, but our teachers perceive them as promoting students' liberal values without adequate effort in teaching and learning. Teachers use these policies to reduce their burden of assigning and correcting homework, providing feedback, and preparing various forms of formative and summative tests. These mentalities adversely contribute to the quality of ME. The childish minds of learners seem to enjoy these policies because they are gradually promoted to higher grades. These implementation realities in schools negatively impact their future learning. The adverse effects of such irresponsible teaching and learning practices are documented in the research literature: students cannot perform basic mathematical operations until the end of the foundational level (grades 1-8). Beneath all the problems under the blanket, we blame our students for being unsuccessful in mathematics.

In a similar vein, Chandra expressed his experiences of the assessment of ME. *Reflecting on my educational journey regarding the assessment system, I found that there was terminal, half-yearly, and annual examinations in school education. Teachers and school administrators used these examinations to maintain strict discipline in school. These tests were not used to assess teaching and learning status or to improve the institutional setting to enhance the learning environment; instead, the test results were used to segregate students into different groups. The primary purpose of these tests seemed to be to blame students based on their test scores, resulting in a high dropout rate in school education. As we hear every year after the publication of the results of the SLC (now, SEE), some students have also committed*

suicide. There is some improvement in policies and curricula; however, they have not been well implemented due to a lack of preparedness, inadequate teacher training, budgetary constraints, a lower government priority for education, teachers' unwillingness, etc.

Likewise, in the context of the university assessment system, my experience is far worse than my school education. You (indicating me) are also familiar with the university's assessment system. There were no formative assessment systems at that time. We had to face the final examination, which was conducted directly by the office of the Controller of Examinations. Teachers suggested following the 'Old is Gold', and most of them had conducted their teaching and learning activities based on this book. After completing the solutions to the 'Old is Gold' questions, teachers announced that our course was complete. It seems that the primary purpose of pedagogical activities at the university level is to prepare students for the final examination. In such a situation, how can student progress in their learning? In such an adverse situation, students are blamed for being unsuccessful. Unfortunately, there is little discourse in the academic community about systemic structural domination in schools and universities.

Moreover, regarding your question about my practices, I am not beyond the system. Even though I am aware of the negative impact of assessment on learning in school and university, I have not changed my pedagogical strategies or approaches to assessing students' learning outcomes due to pressure to achieve expected results in the final examination. After the publication of the final results for students, the discourse on academia, on social networks, and mainstream media focused solely on how many students passed the exam, without considering the other forces and components that, in/directly or indirect ways contribute to students' results.

I have already said in our previous discussion that educational policies, in general, curriculum reform, and assessment systems in particular, have been endorsed by the interests of the donor agencies, thereby resulting in the failures of educational programs. It is a hidden reality of our education system that donor agencies hold the reins and formulate educational policy, curricula, assessment systems, etc., according to their vested interests, which are far removed from our ground realities. It is one of the major causes of Nepal's education system's failure. In my opinion, the discourse in ME has not explored the significant problems posed by the foreign domination of neoliberal and neocolonial socio-political and economic policies that restrain the

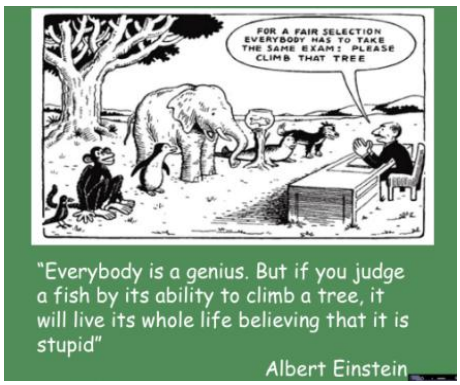
transformation of schools and universities and their academic programs, but instead, we discuss peripheral issues that contribute to a blaming culture.

The above narratives indicate that the assessment system in ME has not gone beyond the concept of assessment of learning, a technical procedure used by external authorities to measure the student's achievement at the end of the academic session. In my opinion, an isolated assessment technique implemented by external authorities in the name of maintaining reliability and validity does nothing more than create a disempowering hierarchy among learners. I realized that only higher standardized test scores do not reflect the quality of education (Torrance, 2011). The narrow testing regime over-glorifies coaching and the mindless reproduction of mathematical knowledge and theorems to harvest higher marks, thereby adversely affecting educational outcomes and restraining learner creativity, innovative thinking, and doing (Knight, 2002; Torrance, 2017a). A traditional test-driven culture wants to produce homogeneous attributes among learners, hindering the differentiated capacities and potential of learners from diverse sociocultural backgrounds (Hopfenbeck, 2019).

Learning is a social process, and the achievement of individual learners is subordinated to or enriched by the immediate environment, depending on whether it supports or opposes the learners (Filer, 2000; Lave & Wenger, 1991). The school environment favors mainstream sociocultural values, norms, and perspectives (Powell, 2022), thereby marginalizing the majority of marginalized students. In this context, Foucault (1977) pointed out that disciplinary power depends on how the educational institution can normalize and control learners through surveillance, threats of violence, and spectacle punishment specifically produced and supplied through standardized tests. The standardized high-stakes test actually reproduces social and economic inequalities because it always reflects the cultural values, norms, and perspectives of the powerful who are already successful rather than recognizing and acknowledging the capabilities, values, norms, and perspectives of culturally othered learners (Bourdieu & Passeron, 1990; Cassen & Kingdon, 2007; Powell, 2022). Those who hold power and gain privilege from society manage and control the educational

Figure 18

Reflection of Assessment of Learning



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institutions that shape the selection of educational experiences and thus determine what and how to assess the values and practices pervading the school curriculum (Habermas, 1972; Torrance, 2017b).

In this connection, describing the negative impact of international high-stakes tests, more than a hundred well-known international scholars wrote an open letter to the director of OECD concerning the ways of measuring educational attributes of learners in the context of great diversified educational traditions and cultures around the world by using single, narrow, biased yardstick could end the engaged, critical and creative learning culture that produces irreparable harm to school and children in general and so-called low performing regions and countries (Meyer & Zahedi, 2014).

Likewise, another dark side of the test-driven culture in ME is that it creates a myth of free competition and independence of educational institutions, curricula, pedagogical choices, and sociocultural, economic, and power dynamics of society (Stobart, 2008). It further perpetuates the illusion that tests are unbiased, technical, and neutral mechanisms that do not harm anyone and are used solely to assess educational outcomes, irrespective of learner sociocultural, political, technological, and economic contexts (Baidoo-Anu & DeLuca, 2023). Those with power and easy access to educational resources also advocate the policy rhetoric of equal opportunity for all to succeed, thereby placing the responsibility for failure inherently on learners themselves (Torrance, 2017b). It endorses only the competitive mentality among the practitioners. The competitive assessment encourages learners to participate in 'Race to the Top' (Obama, 2009), which is relatively secure for minority groups that hold state power, while all others are victims of the competition's intensity (Torrance, 2017a). At this point of inquiry, I have realized that an assessment that focuses only on ranking the students based on their achievement scores seems unhelpful and inappropriate for enhancing engaged learning and deep understanding of the subject matters concerning real-world situations and developing creative and critical thinking; instead, it adversely prompts the creation of a culture of fear and compliance (Fuller et al., 2016).

The fearful culture of assessment has emerged from undue pressure on learners to 'race to the top' at the expense of the quality of learning. The fear is instigated by the forceful engagement in the mindless and lifeless reproduction of factual knowledge rather than in creative and innovative actions that undermine academic freedom and innovation (Cheng, 2015; Huusko & Ursin, 2010). Similarly, Champagne (2011) is also discontent with the assessment of learning that focuses on developing obligation

through the fear of creating disapproval of their learning capacity, which is an attack on academic freedom for students and teachers. The fearful educational environment results in the loss of personal and professional control and a sense of freedom, ultimately hindering the quality of education because learners often respond to test items. This discourse signifies that the assessment of learning is not a neutral mechanical procedure that reasonably determines the student achievement in particular tests but essentially a political process that operates through the implicit forces that reinforce the learners to accept taken-for-granted disciplinary and institutional norms that further help to emerge the culture of compliance (Fuller et al., 2016; Skidmore et al., 2018).

The culture of compliance at certain levels is not so bad in educational institutions, society, and nations that prevent disarray and havoc in organizations. However, the culture of compliance becomes disruptive when it replaces the strategic learning environment and underpins conformity to norms and regulations prioritized by institutions and teachers (Abbate, 2010). The most significant tools for assessing learning are testing, measuring, scoring, and ranking, which compel teachers and students to rely on rules, algorithms, norms, and standards. It is governed by 'machine bureaucracies' (Fuller & Skidmore, 2014) that favor compliance rather than student creative and innovative learning (Skidmore et al., 2018). It is antithetical to critical, self-reflective learning to develop student agentic potential that enriches the culture of compliance (Gaston, 2013). In this regard, Champagne (2011) argued that the assessment of learning was an outgrowth of the corporate university, which was backed by the neoliberal and neocolonial political economy.

Of course, the corporatization of education at all levels is governed by assessment modes that treat knowledge as a commodity and students as customers purchasing knowledge from big universities (Giroux, 2020b). The neoliberal economic policy has used educational institutions as the surest means of instigating its brutalizing structure of governance on education, especially in higher education, through the deployment of educational policies and curriculum (Apple, 2019; Mintz, 2021; Paraskeva, 2016) that are largely prescribed by the donor agencies (Regmi, 2021b). Our state mechanism, basically political leaders and high-level bureaucrats, seems to be too weak to set our agendas in front of the donor agencies, in which aid agencies have prioritized our agendas according to their interests (Regmi, 2023), and we repeatedly face the problem of failure, as my research participant Chandra

indicates in his narrative, we lost everything. At this stage of inquiry, I have realized that the ME curriculum, pedagogy, and assessment become tools for controlling and enforcing powerlessness through the surveillance of disciplinary power used to disrupt the autonomy of teachers and restrain the students' capacity to think creatively, critically, and imaginatively, thereby demolishing an engaged learning culture.

Assessment as/for Demolishing Engaged Learning Culture

The fundamental responsibility of schools and universities is to create a learning culture through their curriculum, pedagogy, and assessment. Learning culture is not perceived as a pre-given set of activities or royal roads that teachers and students should follow. The learning culture has been perceived as a dynamic process of interactions and dialogues among different stakeholders—teachers, students, educational leadership, curriculum experts, and sociocultural actors, to name a few that might contribute to enriching the academic outcomes.

An engaged learning culture was conceptualized during the 1980s to explore and understand the forces that ex/implicitly contribute to students' anxiety towards particular disciplines and tests, feeling alienation and boredom, disengagement in learning, and dropping out of school, aiming to reduce these factors for enhancing the students' achievements (Finn & Zimmer, 2012). Initially, it was conceived to engage students in solving routine problems through drills and practices to enhance their achievement. Student engagement has been measured through regular school attendance, timely assignment submission, completion of classwork, a positive attitude toward subjects and teachers, enthusiasm for learning, developing self-confidence in solving routine problems, and improved test performance (Newmann et al., 1992). It signifies that engaged learning is narrowly conceived students' involvement in prespecified activities in which teachers are purveyors of knowledge and students are passive recipients.

Later on, Finn and Zimmer (2012) addressed the narrow conception of engaged learning by dividing it into four categories: academic, social, cognitive, and affective. Academic engagement only focuses on student achievements in particular disciplines. Social engagement is regarded as obedience to norms, values, and the sociocultural code of conduct to maintain social order. Cognitive engagement is defined as the use of cognitive strategies and expenditure of thoughtful energy through logical, rational, and analytical reasoning and arguments. Affective engagement is the emotional attachment of learners to particular disciplines, peer groups, society, teachers, and

schools, which shapes feelings of acceptance and rejection of values and norms (Finn & Zimmer, 2012; Lamichhane, 2022). These types of engagements seem to cover a broader range than the previous ones; however, they also fail to develop the sense of engaged learning as a holistic learning environment in which learners can build their agency. In this regard, Crick (2012) describes a concept of deep engagement.

Deep engagement is a process of engaging the learners in the learning process from the very beginning of selecting the learning experiences, opting for the pedagogical practices, and instigating assessment as an inbuilt process of learning so that teachers and students can observe and understand the roles of in/visible forces which im/explicitly manage and control the education system (Crick 2012; Lamichhane, 2022). It signifies that deep engagement in the learning process enables learners to explore, understand, and wisely handle the intricacies and complexities built into the education system to envision a better educational environment, society, and nation. Gutstein (2006) captures the essence of deep engagement by using the metaphor of reading and writing the world through mathematics, which seems possible through agency development of learners. In this context, I have turned my attention to exploring the roles of the adopted assessment system in ME to enrich or deter the engaged learning culture in schools and universities.

Figure 19

Consequence of Assessment of Learning

Not allowed to cheat in exam, student beats up teacher

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16 Shares

KATHMANDU, Dec 21: A lecturer at Ratna Rajya Laxmi Campus in Kathmandu was beaten black and blue by an examinee after the latter was not allowed to cheat in the examination today.

Lecturer Prakash Pudasaini was beaten black and blue by the student after he was prevented from cheating in an internal examination of a paper of Bachelor in Social Work (BSW) program, according to Pudasaini's colleagues.

When I critically examined assessment practices from the very beginning of the so-called modern mathematics in school, around 1853, in college, around 1918, and at the university, around 1959. I found that it indoctrinated the conception of assessment as a measurement of student achievement through a three to four-hour paper-and-pencil, teacher-made test. The enactment of disempowering assessment systems in schools and universities has cast an enduring imprint, leading to the belief that these are the ways to determine academic quality. It is deeply rooted not only in the mindsets of teachers, students, and bureaucrats but also at the societal level, in which parents have expressed their greed for assessment of learning. An external accountability testing approach of so-called modern mathematics leads to the deskilling and denigration of teaching and learning

activities that promote the conception of obtaining good marks in tests as an ultimate goal of education (Shepard, 2000), thereby somehow provoking students and teachers as well to endorse unethical, unsocial and destructive behaviours for securing the marks in the examination (Figure 19). Torrance (2017a) argued that teaching to good tests has a corrupted influence on teaching and learning that excludes the possibility of creating new knowledge and restraints for developing critical and imaginative thinking, leading the learners to be the muted followers of the teachers and systems that stymie the transformative actions. Moreover, it has a significant effect on learners' lives (Hopfenbeck, 2019). It suggests that the existing assessment system and its implementation seem awkward for fostering an engaged learning culture. The disempowering nature of ME assessment practices in Nepal was also highlighted by my research participants, captured in the following section.

During our dialogue, Surya unearths the assessment issue based on his lived experiences. *Initially, in our cultural practices, particularly in Gurukul/Rishikul education systems pervasive in the Hindu philosophical tradition and possibly other cultural systems as well (these have not been explicitly explored yet), the Guru explicitly dialogues with his Shishya (students) to determine their areas of interest and aptitudes. After deciding on the subject of interest, an engaged learning opportunity was created in which students accomplished their tasks at their own pace and in their own time. There was no rigidity in the timeframe and the so-called standardized tests. Guru was autonomous in assessing his students' learning outcomes. After receiving confirmation from students that he could demonstrate or perform the assigned tasks, Guru determined the learning status based on performance, ensuring the tasks were genuinely accomplished. Guru awarded and upgraded the students without any external forces involved. Later, such teaching and learning activities were labeled as rote learning. Our educational and assessment practices have been accused of being inconsistent and unreliable, which has vilified our rich historical notions of education, particularly after the introduction of Western Eurocentric ME and the education system of Nepal in general. However, rigorous research has not been done to explore the system's pros and cons. Unfortunately, without research evidence, we ignored our educational system by being strongly influenced by foreigners, a slippery point of education that forcefully pushes us where we are now.*

I (and probably others too) have experienced that the existing assessment in ME is nothing but the rhetoric of standardized testing that insistently demolishes the

learning culture among practitioners. As university professors, we compel our students to perform well on tests regardless of their learning performance. It distorts the academic learning environment, whether willingly or unwillingly. The effect is seen in the classroom, even at the Master's and MPhil levels, where our students have frequently questioned whether these particular questions are worth for the upcoming examination and why we need to focus on the chapter with fewer marks. It indicates that our preservice teachers have deeply rooted mindsets about education as preparation for examinations, which are then transmitted to schoolchildren, thereby perpetuating such mythical perceptions in society.

Moreover, with assessment-driven curricula and pedagogical practices in ME, teachers and students have started to demonstrate dishonest instincts in educational institutions to win the race to the top, which is underpinned by the transitional, unstable, and deceitful political system of the country as well, because the education system cannot remain in isolation from it. For example, you can see the political appointment of academic leaders in educational institutions—schools, universities, research centers, and campuses based on their political affiliation rather than their academic and research contributions, severely damaging the academic, professional, and research culture in our schools and universities. We are no more than the spectators of insidious events in schools and universities. In my opinion, when schools and universities began to foster a culture of cheating through the deployment of assessment-for-learning practices, the effect on teaching and learning was tarnished, and the impact on society and the political arena was corrupted.

In this regard, Chandra has ventilated his arguments regarding the adverse effects of the assessment of learning. *I mentioned in our previous discussion that the country's political scenario has also corrupted our education system. The adverse impact of political scenarios on our country's education is often dismissed as radical and invisible to many stakeholders. I have bitter experience with political actors/leaders, specifically student union leaders, who interfere with the examination system. In my opinion, first, they learned from assessment practices in schools and universities that involve secretly engaging in dishonest behaviour. Later on, they aggressively interfere with examination systems, and we, as faculty, become powerless spectators of unethical and dishonest behavior in examination halls that cause irreparable damage to an engaged learning environment in schools and universities. It becomes a chronic disease in educational institutions that promotes a non-*

transformative, regressive environment in an academic milieu and unknowingly transmits it to society. This scenario has been increasing for the past 1.5 decades.

Moreover, we do not forget the adverse effects of a neoliberal political economy that primarily focuses on unethical competition for personal gain, prioritizing the first-order desire over societal and national prosperity. I find the nexus between neoliberal political economy, which unduly orients people to maximize their income, profits, and expenditures to fulfil their material desires. The malicious effect of such a socio-political milieu negatively encourages students to secure better marks at any cost. Students who believe they cannot achieve their expected test marks resort to dishonest practices during examinations. We have been continuously observing corrupt activities, namely using cheat sheets, crib notes, copying from peers' answer sheets, taking help from outside by intimidating invigilators, establishing access to question papers before an examination, using modern communication technology to obtain the solutions of the questions, etc. since the last one and half decade, which are led by the students' leaders under cover of their affiliated political parties and teachers' union, individual teacher and staff as well. How can we expect change in such a situation? It is one of the hidden factors that disrupts the academic environment in universities. Unfortunately, there are very few questions about their dishonest activities because wrongdoers are in power and may be highly likely to misuse that power against those who oppose them. Some of the incidents occurred last year, and the case was petitioned for judicial judgment in the Supreme Court of Nepal, where the court declared that the leaders of the students' union intentionally carried out a deadly attack to take revenge on the teacher who controlled the dishonest activities in their examinations. There are so many cases across the country; however, leaders of students' unions have dismissed the cases by abusing the political power of their affiliated ruling parties. In conclusion, assessment-driven curricula and pedagogies have not engaged students in creative, innovative, and critical activities. It is necessary to urgently address the issue of assessment that allows students and teachers to engage simultaneously in mathematical activities to enrich their learning, rather than restraining the teaching and learning activities in preparation for tests.

Unveiling the pervasive deficit syndrome in the assessment of learning in our schools and universities, Pawan also argues along similar lines. *I had heard of academic dishonesty in my university education, but had not seen such dishonest incidents during my educational journey. There were sporadic cheating incidents in*

exam halls, but the wrongdoers were immediately and severely punished to deter such illegal and unethical behavior. Sometimes, students were expelled from the exam and prohibited from taking part in university examinations for up to five years. Now, dishonest and unethical activities during the examination period and after the publication of results have become a chronic problem in school education, directly undermining the learning environment. Many genuine students began to question the tests' reliability. They argued that those who obtained marks through dishonest or unethical means and those who worked hard throughout the year to earn good marks in the examination received the same evaluation. How could honest and laborious students be motivated to engage in learning? I have had very bitter experiences with such dishonesty, which I would like to share here.

It was the case of publishing the results of a pre-test of grade 10 (a test at the end of grade ten, held as a formative as well as summative test before the final examination) after the implementation of a liberal promotional policy in school education, in which authority was given to the school to manage the pre-test. It helps teachers identify the students' weaknesses and provide necessary feedback and support to accelerate their learning. Unfortunately, we were unable to control or address the students' dishonesty and unethical behaviour, which was supported by the guardians and the students' union leaders. We prepared the results and handed them to the school attendants to publish after we left, because students who had not been able to secure good marks in the pre-test tried to attack physically. After such incidents, we again decided to conduct the pre-test at the district level. It sounds unpleasant to many stakeholders, but the realities on the ground could not have been discarded. We have to consider why such an environment exists so deeply in academic institutions. The condition worsens daily after the establishment of the federal democratic republic political system in Nepal, due to the over-influence of political parties in the education sector to strengthen their political presence and preserve their voter base, rather than to bring a paradigm shift in education in line with the newly established political system.

I do not mean that the political system itself is regressive, but I can strongly claim that we have failed to manage the system well. You can see the havoc across every sector of the state mechanism, which negatively impacts people's livelihoods and frustrates them. Notably, the younger generations, productive human resources, have not seen a secure future in the country. It is one of the miserable conditions in the

political system of a democratic republic. However, our universities, research scholars, and teachers have not significantly raised the discourse on such issues and thus have failed to create an engaged learning environment. In my opinion, besides other factors that have minimal impact on educational settings, the political commitment, desire, and willingness of mainstream political parties and their leaders appear to be major factors behind students' dishonest and unethical behaviour in educational institutions. Students, teachers, administrative staff, and union leaders are not from another planet; they are the products of our sociocultural, political, and educational milieus. From this perspective, we could not only blame them. They learn from contemporary society, politics, and the education system. To bring about desirable change in education, we need collaborative efforts among stakeholders to disrupt the systemic structures (political, sociocultural, and educational) that constrain the creation of an engaged teaching-learning environment. We must realize that the present education system cannot produce a conscious citizen with high ethical values. I remember a famous folk saying that schools and universities create an environment through the prolonged enactment of an assessment strategy in which those who write good essays on academic integrity get better marks than those who practice integrity in their professions and daily lives. It suggests that universities fail to design appropriate curricula, pedagogy, and assessment systems that deeply engage learners in the learning process, enabling them to become creative and critical citizens.

These stories recalled an incident from my professional journey as a mathematics teacher educator. *It could be any day in March 2015; I had returned to my campus after taking just two weeks of MPhil class at KUSOED. I had been waiting for the campus chief to approve my leave for MPhil study. Meanwhile, before campus chief arrived, two Master's Degree students came to the office. Both are secondary-level mathematics teachers with a decade of teaching experience. I reminded them that this is the last year to submit their dissertations. You have approximately six months to submit your dissertations. If you cannot submit your dissertation, the university will not allow you to submit it. How do you complete your tasks on time? We continued the conversation until the campus chief arrived at his office.*

Student: *Sir, we have had some relief this year. The Ministry of Education has just announced that the traditional SLC marking scheme has been replaced by a letter grading system in which no students will fail.*

Me: *How do you feel about the relief from introducing a letter grading system in the SLC examination?*

Student: *We have no pressure from the administration or parents to prepare students so that the top students can secure distinction or first division marks, and other students will get at least pass marks in the SLC. We will manage time for the dissertations because we do not have to devote as much time to our students as in previous years. Sir, we have to pass the Master's Degree at any cost for our promotions. We have approximately a decade of teaching experience. We do not have any problem-solving bookish questions at the secondary level. Students are also satisfied with our teaching approach. Our class remained pin-drop silent as we started teaching mathematics. Most of the time, students were surprised when we told the correct answers to the bookish questions before solving them. If we have a Master's Degree, we will be easily promoted, which will secure our future. We would heartily request your support.*

Me: *It is difficult for me to understand your arguments. A letter grading system is more rigorous than an absolute numeracy approach. It aims to enable every student to achieve a higher grade, namely an A+, because it believes that every student can reach their full potential in an appropriate learning environment. The letter grading system demands more and more effort, engagement, and dedication from teachers and students to improve overall educational outcomes, rather than focusing on narrowly conceived assessments, such as assigning marks to measure students' learning achievement.*

Students: *Sir, it is a highly philosophical and theoretical notion of the letter grading system. In our context, it is tough to implement because most stakeholders—headteachers, administrative staff, school management committee, teachers, and students have a superficial understanding of the letter grading systems. Last week, our headteachers and the school management committee chairperson also expressed their view that the letter grading system is a form of liberal promotion, in which students are upgraded at the end of the academic year. It somehow relieves the teachers and administration. We do not mean that we do not teach the students properly; rather, it helps us reduce unnecessary burdens when preparing for the examination.*

Me: *After listening to your arguments, I doubt whether a letter grading system in school education enhances the learning environment. What would be the other*

teacher's understanding when a specialist mathematics teacher educator expresses such views regarding the letter grading system? It indicates a high adverse effect on student learning after implementing the letter grading system.

Students: *Sir, you are also familiar with the culture of learning in schools and universities. Most of the activities in the mathematics classroom have not gone beyond preparing for the upcoming examinations. Some private schools begin preparing their students in grade nine, two years before the SLC examination. We have to compete with them. It is a ground reality. We do not remain isolated from these practices.*

Me: *As adult learners, you are also willing to obtain a certificate for your promotions without deeply engaging in learning activities (there is a humorous environment for a while, we laugh). How can school teaching and learning activities be enhanced in such situations? As senior teachers at the reputed schools of the Chitwan district, if you have a conception of learning as only for obtaining a certificate for external recognition, then you have undoubtedly trained your students accordingly. Have you thought from these perspectives? They seem perplexed and nervous, and the environment becomes silent. Meanwhile, the campus chief has entered the room. We greet him.*

Students: *Sir, we understand your motive and encouragement for academic upliftment. The discussion is very fruitful for us. We will do our best to complete our dissertations within the stipulated time.*

The above narratives and dialogues explicitly explore the multidimensional adverse effects of assessment of learning, which have been entangled not only in ME but also in Nepal's overall educational system. We (as Nepali learners) have been taught that our historical educational system is premodern, traditional, irrelevant, and inconsistent, and that it could not produce the modern workforce necessary for industrialization and nation-building. In the context of the South Asian subcontinent, such mendacious narratives had been created and perpetuated by the British Raj in India that had deceitful goals of controlling the people of the region and had to justify their colonial presence in the name of modernizing the nations and their people, who were or still are blamed for being premodern and uncivilized (Chakrabarty, 2002).

The history of mastering approaches to lower-order thinking skills in ME dates back to the British-Indian education system, in which British colonial industrial masters sought human resources capable of efficiently operating the particular

machines to produce vast amounts of their output at low cost. It only requires specific rules and step-by-step instructions to operate the machines. In such cases, speed, efficiency, and accuracy are needed to produce plenty of goods that ultimately generate high profits for the colonial masters. Over time, the assessment of learning, which seemed appropriate for determining the mechanical and technical skills of training programs, has been incorporated into the education system to measure students' achievement under the cover of unbiasedness, standardization, and modernization. The reason behind it was that the British Raj wanted to prepare the organic intellectuals who were Indian in color and British in tests (Fanon, 1967) in such a way that people who had been rated as intellectuals had been provided with high payable and prestigious jobs aiming for luring the other people in their system so that they could have unquestionably supported the British Raj (Chakrabarty, 2002).

In the early stages of what is called modern education, Nepal imported curricula, textbooks, and assessment systems, and hired teachers from India. Students were sent to India for the SLC examination before the establishment of the SLC Board of Nepal in 1990. Likewise, Tri-Chandra College, the first college in Nepal, was affiliated with Patna University before the establishment of Tribhuvan University (TU), the first university in Nepal. The indoctrination of foreign policies and practices into Nepali education has been carried out slowly by Nepali scholars who were first trained in British-Indian education and later in Indo-American education. These scholars rein the country's educational system and shape educational policy, curriculum, pedagogy, and assessment practices accordingly (Regmi, 2023); thereby, Nepali education in general and ME in particular fall under the colonial grip.

Here, I intend to argue that, alongside the foreign curricula practices in mathematics, Nepal began administering teacher-made paper-and-pencil tests to determine student achievement. Based on these tests, students are categorized into two groups: pass and fail. It indirectly urges the teachers to prepare the students for the final examination. Exam-oriented teaching and learning activities focus on delivering factual information to students and arbitrarily requiring them to memorize, recite, and reproduce it without questioning its relevance. Rather than diversifying the assessment approach in education to assess the students' learning outcomes, which should support the enhancement of an engaged learning environment, the government of Nepal has established the Education Review Office (ERO) under the Ministry of Education,

aiming to audit the quality of education at the school level in 2010 through standardized tests.

The ERO has been conducting the National Assessment of Student Achievement (NASA) at various levels of school education, particularly in Nepali, English, Mathematics, and Science. The latest NASA results have not revealed a satisfactory outcome of school education. On average, the study found low performance among grade three students in reading and numeracy. They achieved approximately 43% and 37% in reading and numeracy (ERO, 2020a). NASA results also showed that approximately 32% in mathematics, 37% in science, 59% in Nepali, and 51% in English of grade eight students attained the basic proficiency level, whereas 68% in mathematics, 62% in science, 41% in Nepali, and 49% in English have achieved the below basic proficiency level (ERO, 2022). Likewise, the average achievement of grade ten students was approximately 32% in mathematics, 37% in science, 20% in Nepali, and 30% in English, all of which are below the basic proficiency level (ERO, 2020b). The NASA results consistently revealed poor learning outcomes among schoolchildren across all major subjects of school education. It is a terrible situation in the country's educational system, where there is a massive gap between the intended and the attained curriculum.

Nonetheless, the pass rate of university students in non-technical subjects is not particularly high. The pass rates of major universities TU, PokU, PU, KU, FWU, MU, and NSU in non-technical faculties/institutions/schools are nearly 29%, 55%, 56%, 90%, 20%, 23% and 31%, respectively (UGC, 2023). These universities hold approximately 78.3%, 5.8%, 5.5%, 3.1%, 3%, 1.8%, and 0. 4% of the total number of students enrolled in university education, respectively (UGC, 2023). The pass rate at the four universities—TU, MU, FWU, and NSU, which account for nearly 87% of the total student population—is below 31%, indicating the dire state of the country's higher education. We have observed that the pass rate trend has not improved significantly. In 2002/03, the pass rates for students at the bachelor's and master's levels at TU were approximately 26% and 27%, respectively (Mathema, 2007).

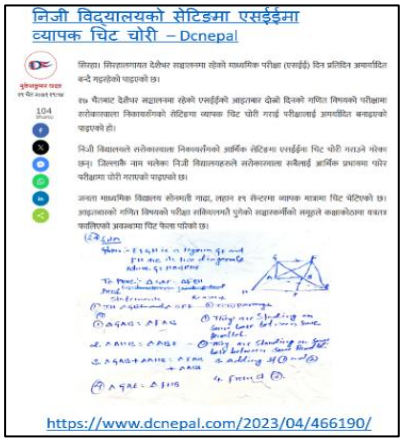
There is another discourse as well: whether student achievement scores on paper-and-pencil tests ensure a quality education. If we assume test results are a good indicator of an engaged learning culture and quality education, the educational system fails to ensure quality education in both schools and universities. In this context, there is one propelling question in my mind: why do our schools and universities seem to

fail to introduce alternative assessment practices for creating an engaged learning culture rather than promoting the teacher-made paper-pencil test as a standardized form to assess student achievement that unintentionally helps pervade fraud activities in examinations in the name of obtaining the so-called highest or pass marks (grades).

Describing the teaching and learning scenario and assessment system of university education in the early stage of the establishment of the TU, T. J. Lardner, one of the Fulbright lecturers of mathematics during 1965-1966 at TU wrote that teaching and learning activities either in bachelor and intermediate level focused on memorization of mathematical factual information in details just before the examination time aiming for enabling the learners to answer enough questions on the test for obtaining a passing grade (Lardner, 1967). Teachers who tutored students for additional income put much effort into preparing their students for the upcoming examination, guessing which questions were most likely to appear. The 'guess' examination papers were found in nearby bookshops before the examination times, and university professors were involved in an invisible way. Likewise, he reported that if students perceived the examination questions as too difficult or, rightly or wrongly, felt that the syllabus was not followed, demonstrations or strikes were organized during examination times (Lardner, 1967). More surprisingly, he expressed his discontent with students' activities and public support for wrongdoing in academic institutions, which prompted students to dictate to and compel university officials to address their unethical agendas under the threat of student strikes. In such circumstances, he further explained that bringing about a minor improvement in university education, in general and in mathematics in particular, required significant changes in the structural system of university education, sociocultural conditions, and student and public perceptions of education (Lardner, 1967).

Figure 20

Fraud in Examination



The above discourse indicates that, from the early stages of university education, teaching, learning activities, and the assessment system did not focus on developing an engaged learning environment. The condition has not changed yet; destructive activities of students' unions, teachers' unions, and staff unions, backed by

their mother political parties, cause irreparable damage to the quality of university education (Mathema, 2007). Excessive political activism among students, teachers, and administrative staff who are supporters or members of the respective sister organizations of their mother parties has made the governance of higher education institutions extremely difficult. It has caused inordinate delays in introducing necessary reform programs such as curriculum, pedagogy, assessment, and research activities (Mathema, 2007). Here, someone might argue that political activities within educational and other social organizations can enrich democratic practices; however, the conditions at our university are different. In the name of politics, they focused their activities on fulfilling their hidden interests of promotions, appointments to particular positions, and financial support for their organizations, to name a few. They never participate in policy discourse or in debates on national and international educational issues, contemporary burning problems, and research activities (Mathema, 2007).

In this context, indicating havoc and turmoil in universities produced by the unnecessary intervention of ruling political parties and their sister organizations, Mathema (2007) has used the metaphor of a dead university to illustrate the inability or failure of universities and their professors to bring a paradigm shift in education and society through their rigorous discourse and research on contemporary national and international issues. As my research participants expressed in the above narrative, most of the leaders of the student unions and professional sister organizations of teachers and staff of mainstream political parties focused on influencing the examination to support their cadres/members to achieve pass marks (grades) and encourage them to commit fraud/dishonest activities during the examination time.

Figure 21

Connection of Fraud Activities with Concerned School Teachers and Staff

Dishonest and fraudulent activities during examinations in Nepali schools and universities have become chronic problems that hinder the creation of an engaged learning environment. It is not difficult to understand the scenario of dishonest

activities during the examination period from Lardner's (1967) descriptions, which he observed during his stay in Nepal (1965-1966). Similarly, Sellar et al. (1981) noted that teachers and administrative staff were under heavy pressure to pass students despite their poor performance in subjects. Moreover, they said schools had little control over fraud and dishonest activities. More interestingly, the concerned authorities are tolerant of exam cheating, and teachers are susceptible to local pressures and patronage (Sellar et al., 1981).

I have realized that teachers, students, and educational authorities hold the belief that education, or more precisely learning, means passing exams and achieving good scores on paper-and-pencil tests. It is only a good indicator of quality education that unintentionally supports dishonest and fraudulent activities in examinations. Behind the pervasiveness of involvement of students in exam cheating, dishonest, and fraudulent activities in Nepali schools and universities, Fleck (2000) saw the ethnocentric reasons because teachers, administrative staff, and concerned authorities do not take into consideration that exam cheating, plagiarism, and other academic frauds need to be controlled for enhancing the engaged learning environment. The consequence is that exams lack strict rules and regulations, and students cheat frequently (Joshee, 1994).

Figure 22

Teacher Engaging in Fraud Activities in Exam

The culture of exam cheating is one of the problems in the assessment of learning approach, in which students are evaluated at the end of academic sessions, aiming to segregate them into pass or fail rather than enhance their learning and enable them to be engaged learners. It is one of the malpractices in an academic institution that has been ingrained in the culture of assessment of learning, not only hampers the academic engagement of learners involved in fraud, but also demotivates those who want to be honest and fair (Bimoli, 2014). Discontenting our education system from school to university, a journalist, Bhattarai (2023) wrote in Kantipur, a national daily newspaper, that our education system has never improved because of the deep-rooted mindset of assessment of learning in which students from school to Master's level are

involved in malpractices to secure pass scores (or highest scores) rather than engaging in creative and innovative activities. There is no single cause behind exam cheating in schools and universities. Debella et al. (2019) identified that school, student, teacher, and social-related factors are the causes of cheating that implicitly or explicitly approve dishonest and fraudulent activities in the educational milieu, further supporting the perpetuation of malpractices in examinations. Describing the scenarios of exam cheating, plagiarism, and fraud in Southeast Asian countries, Nguyen et al. (2017) argued that, to obtain higher scores, teachers, parents, and administrative staff often ignore their pupils' cheating in examinations.

In this regard, UNESCO (2018) also explored the multiprong adverse effects of assessment of learning that hinder the quality of education in the Asia Pacific region. It reported that unidimensional assessment of learning promotes competition in an academic institution that breeds corruption, fuels stress and anxiety, simplifies and narrows the curriculum into daunting tasks, and encourages teaching to test, among other (UNESCO, 2018), all of which cause irreparable harm to educational sectors. Students and their parents have everlasting beliefs that education means teaching to the test, which casts a shadow on holistic education (UNESCO, 2018). It signifies that the assessment of learning culture in schools and universities distorts the engaged learning culture.

Figure 23

Exploration of Fraud Activities in Exam

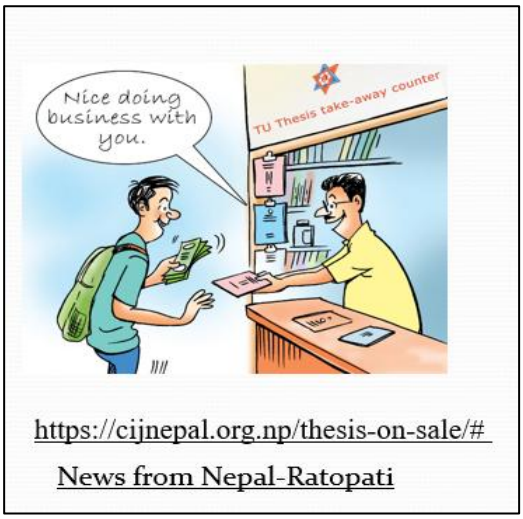
Nowadays, Nepali electronic and print media have reported on exam cheating, academic dishonesty, and fraudulent activities. The result of malpractices in the assessment of learning in higher education is that teachers, university professors, private schools/colleges, administrative staff, and parents are found to be involved in academic fraud for short-term satisfaction or achievement (Setopati, 2016; MyRepublica, 2021). Even in MPhil, a research-level university degree, exam students are found to be involved in cheating (Rai, 2022). University professors and the former vice-chancellor of a Nepali university were accused of plagiarism (MyRepública, 2016). The fraud activities seem uncontrolled and have escalated to violence, with

students beating up their professors for not allowing them to cheat on exams (MyRepública, 2021). Likewise, some of the owners of bookshops, photocopy centers, and thesis supervisors are also found to be involved in contract cheating to prepare Master's degree students' dissertations (Acharya, 2016, 2017, 2018; Bhattarai, 2023). Moreover, Dahal (2023) pointed out some of the fraud activities—exam cheating culture, high-profile authority involvement in plagiarism, university teachers and staff connection in contract cheating, fake degrees, and fraudulent credentials for PhDs in the horizon of Nepali educational landscape that not only demolish engaged learning culture but also possibly raise a question on the quality of our school and university degree in a national and international academic arena.

From the above discussion, I have realized that exam cheating, academic dishonesty, misconduct, plagiarism, contract cheating, and fake degrees are the most significant factors that adversely affect the learning environment in general and ME in particular. Because of the focus on assessment of learning in ME, students are willing to get the highest scores at any cost, and teachers are lured into academic misconduct and plagiarism to secure promotions and appointments to high-profile jobs in governmental and non-governmental sectors. Such beliefs and attitudes are found to be instigated by the neoliberal modern political economy, which teaches practitioners to engage in unhealthy competition for personal benefit over social and group interests. Likewise, academic dishonesty is perpetuated through the privatization of education and heavy politicization of all sectors in Nepali education that support covering the misconduct and unethical activities in examinations and other sectors of education that extensively create a massive challenge for reformation and transformation in the education sector (Bista et al., 2020; Khada & Bhattarai, 2021; Mathema 2007).

Figure 24

Academic Dishonest in Higher Education



Assessment as/for Enriching Disciplinary Egocentrism

The discourse in ME, in particular, and other social sciences, in general, showed that their teaching and learning activities had been increasingly becoming less

an art and more a technical process in which, most of the time, teachers need to teach procedures, algorithms, and dry techniques to be successful (Hayden, 2020; Pant et al., 2023; Schoenfeld, 2004). The mechanical and bureaucratic form of the education and assessment system has been ex/implicitly, supported by neoliberal political economy, a mutated form of neocolonial political agenda (Quijano, 2000; Regmi, 2023). The neocolonial-backed educational policies and priorities of today's world have been driven by a positivist paradigm in which school and university curricula are inclined to develop mechanistic skills through vocational training that have been underpinned by the supranational organizations—WB, ADB, IMF, USAID, and others, implicitly aiming to control within their interests and thoughts (Regmi, 2023). Technical and vocational training is necessary but insufficient to develop the human imagination and cultivate alternative visions through the creative arts (Greene, 1995), ultimately promoting a closed/formalist vision of education (Eisner, 2005).

The implementation of a formalist vision of education in schools and universities develops the images of curriculum as the collection of discrete subject matters and cultural reproduction (Schubert, 1986) that instantly promotes a mechanistic pedagogy, which reproduces the mathematical facts and knowledge through the lock-step algorithms (Eisner, 2005; Pant et al., 2023). Moreover, the formalist vision of education has been underpinned by Platonic views of reality, particularly in ME, where mathematical reality is given, independent of human experience (Ernest, 1998). It remained dominant for several centuries, not only ignoring an alternative view of reality as dynamic and contextual but also discarding the possibility of an emerging notion of reality, and thus heavily embracing universal and perennial views of curriculum (Charlene, 2006). It offers and widens views of pedagogy as an indoctrination of abstract ideas, knowledge, and values into learners. It is akin to banking education, which focuses on transmitting knowledge without considering the complexity of the learning environment (Freire, 1993). In the long run, the implementation of formalist visions of education in schools and universities further supports the development of technocratic and bureaucratic ideas among stakeholders—teachers, students, curriculum experts, administrative staff, high-profile authorities, and parents that restrain educational activities within the four walls of the classroom. Teachers have only started to develop students' skills necessary to reproduce the given knowledge that satisfies the externally set standards as a quality of education, which are measured through assessment of learning. Now, I turn my

inquiry to explore how the existing assessment system in school and university ME has contributed to the development and spread of a disciplinary egocentric view.

It could be any day in March 1997. I had been reading in my M.Ed. second year. There was a course named Real Analysis. It was one of the most challenging courses I had ever taken during my journey in ME as a student. It included the content of real numbers (point-set topology), sequences and series, limits and continuity, differentiation, and the Riemann integral. It was a theoretical course that included rare numerical problems. Our professor was always rushing to complete the course in the stipulated time. He continuously wrote his notes on the blackboard and compelled us to copy them. We were baffled like a crow in the fog. Is it our destiny or more than that? When students raised questions about the application and implications of the classroom content to real-world problems, the ready-made answer was that it was not necessary for the final test. It would be best to master the given theorems in the textbook or teachers' notes. The relationship between real analysis and other disciplines, as well as its real-world applications, is beyond the scope of this course. As I remember, we always got the same answer as stated above at every level of university education and in all grades at the secondary and higher secondary levels. Immediately, one of my talkative friends asked when and at what level we would get an opportunity to discuss the applications of mathematics in real-world situations.

After listening to his argument, the professor gently replied that if we spent more time discussing the applications of the mathematical theorems in real-world situations, it might create pressure to complete the course within a specified time. Likewise, you do not need the alternative and emerging concepts, skills, and abilities that might adversely affect your final tests. That is why I do not prefer to discuss emerging topics in the classroom beyond the syllabus. Finally, your performance and ability to apply the mathematical concepts, knowledge, and skills to solve real-world problems do not matter in the tests. When you enter the job market, you will be judged primarily on your academic credentials (grades or test scores) rather than your capability and performance. We have un/-knowingly developed or are gripped by, the view that learners' capability or efficiency can be reflected only- in their academic grades (marks). You can see the provisions of the Public Service Commission and the University Service Commission of different universities; the first step is to shortlist the applicants based on their academic qualifications. For instance, if you have a first division (above 60%), distinction division (above 75%), or grade A, you have been

ranked as first, and those who have not achieved such a division or grade are obviously ranked as lower class. I do not totally discard your arguments, but we must follow the systems that do not allow us to cross the boundary of education.

We (students) were bewildered and were in awe for a while. The environment becomes pin-drop silent. Meanwhile, I raise another question. Sir, we agree with your opinion, but the major problem I (and possibly others) faced is that I do not conceptualize the subject matter discussed throughout the course, even though I can easily define mathematical concepts such as limits, continuity, derivatives, and more. Likewise, I can easily recite the statements of theorems, methods, and procedures, along with the required facts and reasons for proving them, as if they were mantras for certain ritual ceremonies. In this case, could I have been rated as a talented student in mathematics? What other attributes can rank us as intelligent or gifted students if this is not true?

I have also raised other questions. Who were/are responsible for such practices? What forces have enforced the continuation of the disciplinary curriculum, pedagogy, and assessment system for five decades, even though most university teachers were not ready to take responsibility? I do not have the answer to your query because I have not been invited to design or formulate a curriculum or to select the assessment system that has been implemented in university education, replied the professor. I only fulfil my duties as a university professor. In my opinion, those involved in these processes might have the solution to your curiosity. You have indeed raised significant issues, but discussing such topics does not fit our pre-determined curriculum and assessment system. Let's not waste our time discussing subjects outside the syllabus that do not support us as successful teachers and good learners. Again, we started our business; he wrote his notes on a blackboard, and we hurriedly copied them.

The above narrative helps us to understand the pedagogical activities at the university level. The pedagogical activities are found to be heavily guided by the university's assessment system. Most of the teaching and learning activities have centered on exam preparation. It has strongly reinforced the view of assessment of learning as an unquestionable technique that supports the development of deep-rooted mental schemas among practitioners (Mezirow, 1991). Assessment of learning can only measure the factual information accumulated by the learners. It simply asked for the recitation of disciplinary knowledge, discarding its interrelationships and

interdependence with other human disciplines, which gives rise to disciplinary egocentrism (Richter et al., 2009).

Disciplinary egocentrism has two prongs: negative relatedness and negative perspectives (Connor et al., 2015; Richter et al., 2009). The first is the condition that prevents practitioners from seeing the connections among STEM disciplines. Practitioners may rejoice in the discipline, and the university imposes compartmentalizing knowledge into discrete fields. The overemphasis on disciplinary knowledge, skills, and expertise in higher education in the name of producing highly specialized human resources in the field affects the formation of departments in which faculties are unwilling to share ideas with faculty members from other departments (Belbase et al., 2022). Curriculum designers and teachers demonstrate their lack of readiness to accept, embrace, and engage in transdisciplinary discourse, and thus, their students reveal negative beliefs and perceptions towards transdisciplinary knowledge and skills (Belbase et al., 2022). Many schoolteachers and university faculty members rejoice in disciplinary knowledge throughout their lifetime because our schools and universities have only acknowledged and implemented the disciplinary knowledge and skills through the educational apparatus—curriculum, pedagogy, and assessment, ultimately making them unable to learn alternative approaches and apply them to their discipline (Luitel, 2022). It further creates an environment where disciplinary egocentrism has been groomed and safeguarded its evergreen presence in schools and universities.

Likewise, the narrow view of education as only for harnessing the disciplinary knowledge and skills to prepare for tests has played a negative role in developing creative, critical, and imaginative thinking and skills necessary for becoming conscious citizens. In this stage of my inquiry, I have realized that our schools and universities and their curricula, pedagogies, and assessment systems have ingrained disciplinary egocentrism that makes their faculties and prospective teachers more disciplinary egocentric, so that they do not realize the necessity of the inter/trans/multidisciplinary discourse in the educational institution. It is a deeply rooted mental schema or structure deeply entrenched in academic culture, which is very challenging to escape (Mezirow, 2012). In this connection, Klaassen (2018) also argues that "once ingrained in a certain discipline, it will be hard to lower disciplinary egocentrism" (p. 852), which ultimately might take the form of individual or

institutional perspectives. The effect is that practitioners are highly unwilling to accept alternative educational perspectives (Connor et al., 2015).

The second feature of disciplinary egocentrism is negativism about other views or perspectives beyond one's discipline (Connor et al., 2015). From this perspective, I have realized that the notion of disciplinary egocentrism is associated with the modernist view of mathematics, which celebrates mathematics as a pure body of knowledge and may ignore other forms of mathematical knowledge developed worldwide (Luitel, 2013). The modernist view of mathematics became a powerful tool in the hands of colonizers, helping create the acculturation of ME that acknowledged only Western perspectives, values, and cultures (Bishop, 1990). Luitel (2022) explains that "historically, mathematical knowledge was appropriated by the Western colonizers, and Asian worldviews—planetary, dialectical and pro-nature were stripped from the original academic texts" (p. 39). It again restrains practitioners from bringing alternative perspectives—ecological, critical, imaginative, and spiritual into mathematics curricula, pedagogy, and assessment that prompt the disciplinary egocentric notion in STEM disciplines. Separation of ME from the context of learning in which learners are unable to see the connection between mathematical knowledge and their daily lives and realworld problems decreases the possibility of deep engagement in learning processes, creating barriers to cognitive development (Bradbeer, 1999; Richter & Paretti, 2009).

From the social constructivist perspective, the cognitive development of the learners occurs when they have ample opportunity to interact with the immediate environment in which they share their ideas and experiences, critique other views and opinions, question the taken-for-granted assumptions, and invite others to participate in discourse (Cook & Cook, 2005; Stetsenko, 2017; Vygotsky, 1978). The opportunity to engage in discourse and communicate one's ideas to the larger community has been diminished when learners fail to connect mathematical content and concepts to their context. The disciplinary egocentric thought in STEM disciplines holds the learners within its narrowly conceived terrains of imparting disciplinary knowledge in which learners rarely see the connection of abstract mathematical concepts to other disciplines and realworld problems that help develop the mathematical othering (Abtahi et al., 2020), resulting in negative and disempowering images of mathematics (Lamichhane, 2020; Luitel, 2009). Learners with negative images of mathematics cannot deeply engage in mathematics learning, adversely affecting their social and

cognitive development (Lamichhane, 2022). In this connection, one of my participants, Durga, portrays her experiences, which are presented in the following paragraphs.

During my academic journey in ME as a student, I was not aware of the connection between mathematical knowledge and other human disciplines because I had not been taught to interrelate mathematical knowledge with other subjects and realworld problems. Un/knowingly, I conceived education as imparting the mathematical knowledge, concepts, and skills necessary for the upcoming examination for getting certified. In my remembrance, from secondary to undergraduate levels, I had never had an opportunity to participate in the discourse on the application aspects of mathematics. As a student, I was instructed to solve bookish problems through certain algorithmic techniques. Sometimes, if students had solved the bookish problem using different procedures, our instructors discouraged them and strongly suggested using standard methods to secure the highest grades (marks) in the examination. They argued that if the teachers are unfamiliar with your approach, they may rate your solution as wrong. I think that all instructors' ***Arjun Dristi*** *(ultimate goal) was to enable the students to pass the final exam. As I already stated, our education system, in general, and ME, in particular, convey that learning means passing the examination with good grades.*

As I reflect critically on my educational and professional journey, I find myself like a reined horse. There is a compelling situation in which one must act in accordance with the instructions of those in power. The curricula and assessment systems have already been designed. I need to prepare the students within the given standard framework. So, I couldn't change my assessment strategy, even if I wanted to. I have regularly been pressured by the headteachers, parents, and media to focus my pedagogical activities on preparing for the upcoming final examination. In this way, all our activities are exam-oriented, which prevents us from going beyond the narrow boundaries of disciplinary knowledge, skills, and algorithmic procedures, casting a shadow on other aspects of education.

What invisible forces compel us to adopt the highly compartmentalized, isolated, and subject-centric approach in school and university? Such isolated and subject-centric ME has not brought emerging and contemporary issues—biocultural diversity, socio-political and historical realities, inclusive agenda, sustainable development, etc., into mathematics curricula and classroom pedagogy that not only

restrain the graduates from being aware of these burning issues but also im/explicitly supports for the socially unjust and unsustainable practices as if it is a natural and neutral process. We have observed continuous reform of school and university curricula, but we have identified only very rare changes in the assessment system. This reformation cannot bring a paradigm shift in education. We can unintentionally claim that our education system has not broken the narrow boundaries of the British-Indian education system, which focuses on mechanical and technical aspects, by ignoring the rich biocultural, social, and ecological perspectives of the South Asian subcontinent.

The above narrative of my research participant clearly shows how an externally administered assessment system underpins disciplinary egocentric thought and action in ME. It reveals that the assessment system in schools and universities has not acknowledged an alternative, progressive, and developmental approach to assessing students' learning, instead labeling it as non-standard, inconsistent, and unreliable (Powell, 2022; Shepard, 2000). Likewise, from this narrative, I have realized that the assessment system implemented in our school and university can measure students' ability to memorize factual information, to understand abstract mathematical concepts, and to recite quickly. The major drawback of concentrating teaching and learning activities within the context of the examination is that it may foster a habit of ignoring other social, cultural, and political aspects of ME (Janisch et al., 2007).

Furthermore, practitioners might not solve emerging and real-world problems, be unable to unearth social discrimination, be afraid to challenge the taken-for-granted assumptions, and be unwilling to critically self-reflect on their duties, responsibilities, and rights, to name a few, contributing to developing non-transformative mindsets in which they undoubtedly follow structures, rules, and procedures (Craib, 1992). In this context, it is difficult for practitioners (teachers, students, and other concerned authorities as well) to transform their frame of reference and habit of mind (Mezirow, 2000) through the development of agency and thus, our education system in general and ME, in particular, has been detained within the non-transformative structure that losses its power of welcoming alternative visions and actions. Researcher continuously critiques the impact of educational reform efforts by comparing test scores over time as the benchmark of quality education (Janisch et al., 2007). In the words of Hoffman et al. (2001), educational reform resulting from testing is 'an illusion' that heavily intrudes testing into good pedagogical practices, thereby restraining the introduction of alternative assessment.

Moreover, the gatekeeping effect of testing and labelling students in an unethical hierarchy most seriously impacts many students, particularly those with diverse cultural and linguistic backgrounds (Janisch et al., 2007). The high-stakes testing culture in education seems harmful to low-income and minoritized students, particularly from GSTR (Kohn, 2000), because it focuses only on the mainstream elite culture and onto-epistemic practices (Powell, 2022). The mechanical and technical purpose of education and its accompanying assessment system in educational institutions fulfill a neoliberal and neocolonial aim to support the imperialistic intentions of financial crony capitalism (Powell, 2022).

The liberal financial crony capitalism views education, in general, and STEM disciplines in particular, as tools for preparing youth to function in a Westernized, market-driven capitalist world system in which corporate business houses control educational policies and rein in the educational systems of underdeveloped and developing countries (Regmi, 2023). Though preparing youth for economic activities for the prosperity of the nation is undoubtedly a part of educational institutions, limiting educational institutions only to economic responsibility may conceal different forms of social, cultural, lingual, and economic inequalities and make pupils ignorant of loss of biocultural diversity, violence, drought, environmental degradation, global warming, and many more (Slattery, 2006). More precisely, it disrupts the major purposes of ME: citizenship, solidarity, equity, compassion, social justice, empathy, criticality, creativity, and mental, physical, and social well-being (Jurdak et al., 2016) and thus detains the ME within the narrow boundary of disciplinary egocentrism and pedagogy as/for preparing for the tests that ultimately serves the neocolonial and neoliberal projects (Powell, 2022).

The neocolonial and neoliberal projects in the educational sphere are subtler forms of control exercised through economic means backed by socio-political power, technological appropriation, military and ultra-modern weapons, and trade and business (Paraskeva, 2016). There is an overemphasis on technocratic and mechanistic skills, aiming to produce human robots as educational experts, so that students cannot see the above-stated holistic goals of ME. These goals are "often forgotten or ignored when discussions about the quality of school rest on PISA scores and rankings" (Sjøberg, 2015, p. 113). International tests such as PISA, TIMSS, and others, put intense pressure on underdeveloped and developing countries to standardize their curricula, teaching and learning strategies (Sjøberg, 2015), and assessment systems in

the name of preparing internationally competent human resources. Standardization of curricula, pedagogical strategies, and assessment systems in ME means discarding non-Western knowledge, epistemology, and values (Morley, 2013). It signifies that the OECD, PISA, and others are not primarily educational ventures but social, political, and ideological projects (Sjøberg, 2015) through which the neoliberal and neocolonial metropolitan centers exert their economic, political, social, and cultural domination over peripheral regions (Santos, 2014).

The intentions of the high-stakes tests, standardized curricula, and pedagogy implemented through the recommendation of supranational organizations—OECD, WB, ADB, IMF, etc., clearly have the social, political, and economic agendas of enhancing the neoliberal free-market economy in the name of instigating quality education, claiming to foster the skills and knowledge essential for so-called modern economies and prosperity of the country (Regmi, 2023). In this regard, Zhao (2020) argues that the excellence, efficiency, and quality of education marked by the international high-stakes test are an illusion, a manufactured assertion without sufficient empirical evidence, aiming to distort other forms of practice emanating from the GSTR.

Nonetheless, Nepal has not participated in international high-stakes tests; there are in/direct effects on Nepali ME practices because of the review of the international literature by the scholars and senior bureaucrats who are guided by the technical interest what Habermas (1972) argued as means of control and management that disrupts the agenda of the empowerment and emancipation continuously build the pressure on the authorities to tie up with the international agency for ensuring the quality of education. In so doing, the latest version of NASA, conducted by ERO, raised some questions (linking questions) from PISA and TIMSS as indicators for standardized tests. It is nothing but hegemonic practices in which authorities consent to neocolonial and neoliberal power for dominance over themselves, due to the lack of critical scrutiny of the phenomena (Gramsci, 1971).

Un/knowingly, we fall into the neoliberal political economy that encourages adaptation to the status quo (Chandler & Reid, 2016). It focuses on marketization views of education, advocating rigid, standardized curricula and assessment systems, and dismissing the relevance of cultural sensitivities and alternative ways of knowing. At the same time, the conception of marketization in education inculcates the disempowering notion of education that casts a shadow on collective well-being and

social benefits by privileging individual values, competition, and benefiting very few people (Biesta et al., 2022; Kirylo, 2013). At this stage of my inquiry, I have come to realize that the standardized, high-stakes testing culture in mathematics not only underpins disciplinary egocentrism but also promotes a culture of quietism and the adaptation of Western-centric, monolithic education that supports epistemic injustice (Fricker, 2007; Pohlhaus, 2017).

Assessment as/for Reinforcing Epistemic Injustice

When I critically reflect on my own experience as a mathematics student and educator, I have found that assessment systems in mathematics reinforce instrumental and technical rationality, which has failed to enhance creative and critical thinking (Boud 2007; Tannock 2015). The consequence is that it supports the concealment of inequality and the perpetuation of unjust practices (Kincheloe, 2007). Instrumental or technical rationality is driven by procedural efficiency, memorization, and the speed of reproducing factual information rather than by its sociocultural and politico-economic purpose. Students are labeled successful based on their ability to memorize facts during examinations, thereby developing a naïve/magic consciousness (Freire, 2005) that alienates them from sociocultural, political, and economic realities. Describing the malfunction of mainstream education in society, Theodor Adorno used a metaphor of 'half-education' to reveal the preventive roles of mathematics in particular and modern education, in general, for the development of agency in learners and restricts them to be aware of sociocultural and politico-economic forces embedded in educational settings (Sunker, 1994, as cited in Kincheloe, 2007).

Until and unless we recognize the forces at work in society and nation that have governed curricula, pedagogy, and assessment, which are not value-free and neutral, students are lost in a sea of social and political whirls. However, un/knowingly, ME has been presented in schools and universities as a neutral, objective, and scientific discipline, full of a series of disconnected rules and a body of knowledge (Luitel, 2013) that must be memorized and regurgitated without critical questioning. It signifies that the lack of multiple perspectives in ME—curriculum, pedagogy, and assessment system- manifests not only epistemic injustices in academic affairs but also in a hidden way, supports systemic injustice in society and the nation (Kellner & Gennaro, 2022; Nieminen & Lahdenperä, 2024).

The perpetuation of structural oppression and social and epistemic injustice is a major feature of modern education backed by the neocolonial and/or neoliberal

political and economic system, which makes the majority of youth unable to see their potential and capabilities as agentic subjects (McKenna, 2022; Nieminen & Yang, 2023). It possibly deters a transformation of the world into a better place for humankind and the rest. Likewise, it is a kind of ideology that creates 'epistemological-disabling' that not only makes the practitioners believe in falsehood in social malfunctioning but also shapes their worldview that renders them so that they become incapable of acquiring any knowledge require for challenge and disrupts their skewed understanding of the world (Brunette-Debassing & Viczko, 2022) because the practitioners are in a maze of getting highest marks certified by the 'measuring university' (McKenna, 2022).

The university intends to measure students in terms of rationalist notions of objectification and the quantification of their capabilities, treating them as objects rather than agentic subjects, often situated within evidence-based regimes rooted in colonial vestiges of educational policy, research, and neoliberal reform (Shahjahan, 2011). Moreover, neoliberal schools and universities produce students who help corporate business houses serve the interests of their corporate masters, reduce labor turnover, and increase production levels to maximize profit (Kincheloe, 2007).

In this regard, Greer and Mukhopadhyay (2016) argue that ME has been narrowed to a Eurocentric perspective and has been fully colonized, incorporating a singular reality, objective epistemology, and value-free axiology of mathematical knowledge, which was made possible by early capitalism, a modest form of modernism (Giroux, 2020a). These perspectives help separate mathematics from contexts, culture, and history, thereby ignoring the rich sociocultural, indigenous, and local cosmological knowledge systems and ways of knowing, thereby flourishing epistemic injustice in ME. In the following verse, I have captured my experiential experiences on how the assessment of learning instigates epistemic injustice.

Whirling in the sky of Juggernaut University,
Landing in the shadowed hall of learning.
Abstract concepts and theorems dance on a chalkboard,
The teacher treads on a delicate path for a final assessment.
Learners' capability twists with unspoken theorems,
Which the students lean over and spoil their dreams.
Teachers trace the unscrambled arcs of assessment,
Yet, the assessment looms blur on an agentic path.

It measures unmeasurable traits of learners' knowledge,
Treats them as objects and consumers of knowledge.
Objectification and standardization as its veils,
It ignores students' epistemic resources.

Competition, grades, and norms are celebrated,
Collaboration, criticality, and creativity are deflated.
External recognition and certification are illuminated,
Pushed down students' range of alternative exploration.

Institutional epistemology manifests through power,
Defies learners' epistemology, regards them as lesser knowers.
Sanctuaries of acontextual, acultural, and apolitical knowledge
Nurture of epistemic injustice further thrives like a fractal.

Aligning with my experiences of the role of assessment of learning in my academic and professional journey, as captured in the above verse, one of my research participants, Surya, shares his experience in the following paragraph.

As I remember, from the very beginning of school education to the university level, ME practices seemed to be guided by the assessment of learning. We were instructed through classroom practices and perpetuated the general belief that teaching learning activities meant getting a certificate from the institution. Insidiously, we, as mathematics students, were shaped by the culture of institutions that used closed-book exams to measure rather than assess students' learning.

At a glance, it seems unbiased and neutral because students are asked to report their learning status, which fosters a competitive attitude, motivates them, and enhances the quality of education. However, it is not an unbiased and neutral endeavor that unintentionally aims to improve the quality of education. I realized this when I completed my master's degree and entered the workforce. When I critically explored the contemporary assessment, I found that we are really in an illusion of learning. I do not hesitate to express my experience from my heart. I learned only bookish knowledge, skills, and concepts that seem far removed from our real-world problems. Students were not, and still are not, provided an opportunity to learn mathematics related to their immediate environment and local knowledge, which they interact with daily.

There were and still are general conventions among teachers, curricular experts, administrative staff, and other concerned authorities that students are the

lesser knowers. They are treated as raw materials, and the authorities (including teachers) generally agree that students should be fed external knowledge, skills, and concepts. Explicitly or implicitly, the educational authority wants students to be submissive to society and institutions to help maintain the status quo. To indoctrinate these values and traits into students, the school and university should adopt a policy of assessment of learning to measure students' learning achievement, so that students can endorse the system without question. It explicitly confines students to externally provided and recognized learning materials, which mainstream groups generally set. It does not include local knowledge of the diversified social and cultural landscape of a country like Nepal, which has approximately 125 caste/ethnic groups and 130 lingual communities in which students grew up. If someone has raised questions about mathematical practices and their assessment procedures, the ready-made answer is that we live in the 21st century and need to compete globally. For this, we need to adopt standardized ways of assessing the students so that international communities will easily recognize them.

I have realized that, in the name of maintaining international standards, our ME system has started adopting foreign practices without a critical eye. We forget our historical practices of ME, most of which are on the verge of extinction. As I learned from my ancestors, the goal of education is not only to train but also to foster wisdom that energizes students to be self-directed, confident, and independent learners who are highly enthusiastic to serve society. But now, ME is colonized through marketization. It focuses only on products, efficiency, performativity, competition, and profit, turning educational institutions into factories and students into products to be packaged and sold in a market. I do not mean that the above-mentioned attributes need to be abolished in ME, but the overreliance on them, coupled with the neglect of other aspects, turns students into objects that can be easily melted and shaped to the interests of external authorities. My indication is that, un/knowingly, modern universities and schools do not recognize students as epistemic subjects and urge them to perform within predetermined environments in which learners have no space for alternative discourse in ME.

Likewise, Chandra is discontent with the pervasive assessment approach in ME in Nepal, and he shared his experiences as follows.

The assessment approach in ME measures memorization power and the speed with which mathematical facts learned in classrooms are recited during a time-bound,

closed-book exam. The closed-book exam culture in ME not only pulls students into the terrain of solving bookish questions without considering their social, cultural, and political values, but also limits teachers from designing activities around bookish questions. The overall scenario of teaching and learning activities within the school and university premises seems to be governed by an assessment of learning in which both teachers and students want to remain within their comfort zone. It does not help develop creative and critical thinking in ME and further restrains ME within the narrowly conceived framework of test preparation. I want to say that the assessment of learning has become the culture in our context, in which there is no space for teachers and students to bring alternative discourse to a mathematics classroom. Assessment of learning only celebrates the Western, Eurocentric, highly technical, and ultra-rational ways of deductive knowing that acknowledge only scientific logic and ignore and devalue other ways of knowing, such as metaphoric, poetic, dialectic, and storytelling, to name but a few. I intend to convey that the assessment practice has not recognized students as epistemic subjects and has consistently relegated them to objects that can be easily reduced to the interests of external authorities. In my opinion, it is possibly one of the most potent forces lagging behind the ME program in Nepal, and it needs to be disrupted to instigate alternative practices.

The above explicit narratives of ME's assessment practices explored disempowering and unilateral notions of assessment of learning. It has forcefully reinforced the establishment of false referrals or norms in academic institutions (Nieminen & Lahdenperä, 2024). I have used the term 'false referrals' to emphasize only one aspect of higher education: the certification of learning based on test scores. The achievement score might indicate an individual's capability to reproduce, recite, or memorize mathematical facts and formulae, solve bookish questions, and prove theorems using lock-step algorithms. It does not reflect other aspects of learning—creative, critical thinking, and knowing —and thus binds the teaching and learning activities to the preparation for the final examination. The disempowering motto of obtaining the highest score (grade) in the tests restricts the teaching-learning process to delivering predesigned; prepackaged textbook-loaded, acontextual knowledge and skills, making students enslaved to marks (Boud, 2007; Nieminen, 2020a; Tannock, 2015).

Moreover, the exam-driven culture in schools and universities helps develop the image, perception, attitude, and beliefs about the nature of mathematical

knowledge (Lamichhane, 2019) and possibly construct the mental schema for how mathematical knowledge can be known, demonstrated, and validated (Nieminen & Lahdenperä, 2024). These testing and measuring cultures promote the techno-scientific understanding, logic, and epistemic beliefs among practitioners, and they have begun to perceive mathematics as an objective, value-free, neutral, and acontextual discipline that is easily measured, compared, and controlled (Hofer, 2001; Iannone & Simpson, 2019). Likewise, the culture of testing and measuring may promote superficial learning for grades, thereby encouraging learners to adopt a shortsighted behavior of last-minute preparation for exams to obtain the highest or passing grades (Dochy et al., 2007; Eklöf & Nyroos, 2013). It indicates that, in an exam-driven culture, occupying a superior position and the fading out of all other aspects of learning delimit students' range of epistemic resources (Nieminen & Lahdenperä, 2024).

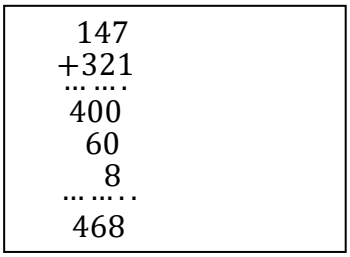
From my own experiences and the narratives of my research participants, I have realized that academic institutions and their authorities have not treated assessment as one of the components that shape students' learning culture. They use it as an external measure of the student's academic achievement at the end of the academic session. In this context, the assessment serves a 'gatekeeping' function, providing permission for higher education or controlling and enabling or restricting entry into a professional career (Raaper, 2019). Students were, and still are, taught in such a way that they are aware of what kinds of knowledge are necessary and how to demonstrate them in examinations (Nieminen, 2020a, 2020b).

The numerical format for assessing students' learning outcomes promotes objectivity, performativity, universality, and acontextuality, which are associated with the epistemic nature of absolutist views of mathematics (Solomon & Croft, 2016), thereby enriching epistemic injustices (Tanswell & Rittberg, 2020). The ignorance of other forms of knowledge and ways of knowing, and the enhancement of lock-step algorithmic in schools and universities education have led to the 'fetishization' of official skills and expertise (Wheelahan et al., 2022) that degrades the learners as lesser knowers (Nieminen & Lahdenperä, 2024), which is also a form of epistemic injustice.

Students are taught to become obedient members of particular social, cultural, and political orders so that society can function well (Biesta, 2015). Well-functioning has been conceived as free from disturbances and challenges. An implicit aim is to manage and control the academic institution and society for individual benefits

(Habermas, 1972). Performativity, reliability, unbiasedness, objectivity, and rankings are significant attributes of matric-based academic institutions and societies that have played a decisive role and could govern the learners accordingly (Ball, 2012; Beer, 2016; Mau, 2019). There is no space for students to express their views and ideas freely and to autonomously engage in a knowledge construction process as epistemic subjects (Fricker, 2016).

When I reflect critically on my academic journey, I find myself as a non-cognizant and non-epistemic agent because I have always been confined by the structural assessment practices in schools and universities, focusing on how to increase my marks (grades) in the forthcoming examinations. My knowledge and skills in counting and doing some basic arithmetic operations have not been recognized. I was somewhat familiar with local measurement systems such as Muthi, Chauthai, Mana, and Pathi for measuring grains, milk, Ghee, etc., and Angual, Kuret, Vitta, and Haat for measuring the length of objects. However, these measurement systems have not been recognized in schools. Likewise, I learned some basic arithmetic operations that were quite different from the modern system—for instance, adding two numbers from left to right (adding the greatest place value digit first and then shifting to the right) (see Box 7). Almost all of these systems are on the verge of extinction. Students are discouraged from familiarizing themselves with their local knowledge systems because these systems are deemed unscientific, inconsistent, and lacking standard algorithms. The impact is that my childish mind has been shaped to believe that the mathematical knowledge, skills, and concepts in our society, culture, and history are not worth including in school mathematics curricula, and that those who use such knowledge, skills, and algorithms are illiterate. It was further extended by the university ME, which has no place for local cosmological knowledge, the history of mathematics, local measurement systems, or ways of knowing in the curricula, pedagogy, and assessment system (Lamichhane & Luitel, 2023a). These are some examples of how we, Nepali mathematics educators, teachers, and students, have suffered from epistemic injustice (Fricker, 2016). In this regard, Bishop (1990) expressed his extreme discontent with the approach of modern mathematics, backed by Western Eurocentric thought and ideology, as a secret weapon of cultural imperialism.



Box 7 *Way of Addition in Rural Part of Nepal*

Cultural imperialism is the process of customizing the GSTR people in the name of providing modern education, financial and technological support, and consultancy services through Western-Eurocentric ideology—singular truth, unilateral ways of knowing, scientific logic and deductive reasoning (Luitel, 2009) and Western-Eurocentric values and norms—individualization, marketization, human capital, profit, and individual-self (Kariwo, 2023; Valero, 2023**)** to establish the superiority of the Western-Eurocentric thought so that the learners from GSTR regions condemn local cosmological knowledge systems and ways of knowing and doing (van Stam, 2017). In the long run practices of such mathematics in which illusions of objectivity, standardization, universality, comparability, economic growth, materialistic development, and certainty of future career were created through the curricula and pedagogies that are further insisted by marks (grades) obtained in tests (Nieminen & Yang, 2023) help brainwash the practitioners so that they can easily be conditioned on the system and have started to celebrate the superiority of the Western-Eurocentric thought (van Stam, 2017). It is a vicious circle of colonialism (van Stam, 2017), shaped by the invisible and secret forces of modern ME, which treats learners as objects and uncritical consumers of knowledge (Naidoo & Williams, 2015; Raaper, 2019).

In this regard, labeling the modern university as a measured university, McKenna (2022) argues that knowledge and knowers become products to be packaged, bought, and sold in an open-market, in which assessment assigns a value (price) to these commodities. Critical reflexivity, epistemic resources, agentic development, creative and imaginative thinking, and other social, cultural, political, and environmental issues are deemed minor in such adverse situations. It signifies that assessment of learning shapes the curriculum and pedagogy and governs the purpose of ME (Brown & Knight, 1994; Nieminen & Ketonen, 2023; Raaper, 2019). That is, assessment of learning, a major component of modern ME, invisibly plays a significant role in instigating the epistemic injustices.

Chapter Summary

In this chapter, I have addressed the first part of the third research question by exploring how the pervasive practice of assessment of learning has been informed by the neoliberal socio-political-economic policy, a mutated form of colonialism. I have explored the four attributes of the disempowering assessment system. The assessment of learning approach focuses on fault-finding in students' work and labeling them as

unsuccessful, rather than providing suggestions and feedback to scaffold their learning, thereby undermining an engaged learning culture.

The assessment of learning approach in ME confines teaching and learning activities to preparation for the upcoming examination. It insidiously indoctrinates conceptions of education as/for external recognition, demolishing an engaged learning culture, and implicitly promotes dishonest and fraudulent activities in educational institutions. Likewise, the assessment of the learning approach used to assess the learning output fosters disciplinary egocentrism in ME because it does not focus on exploring the interdependence and interrelationships of mathematics with other disciplines and real-world problems. Finally, I have unearthed that the assessment of learning approach implemented since the inspection of modern mathematics in our context is not a neutral endeavor. It not only devalues learners but also fails to recognize majority-minoritized learners as epistemic agents, thereby reinforcing epistemic injustice.

In chapters IV, V, and VI, I have explored the disempowering notions of curriculum, pedagogy, and assessment, which have been largely shaped by neocolonial and neoliberal thought. In the next three chapters, I have envisioned an inclusive curriculum, futuristic pedagogy, and transformative assessment, aiming to address the shortcomings of the existing ME and offer the transformative ME.

CHAPTER VII
CONSTRUCTING AN INCLUSIVE VISION OF CURRICULUM

In the previous chapters, I explored how colonial remnants persist in our ME, even though Nepal has never been colonized. I have realized that, in the hands of colonial power centers, mathematics becomes one of the powerful tools for managing and controlling the people of GSTR through the instigation of the modern scientific onto-epistemic approach. Moreover, colonial power centers have skillfully utilized the invisible, seemingly neutral cover of modernizing, standardizing, and universalizing the education system, backed by a neoliberal political economy (Regmi, 2023).

Un/knowingly, we are uncritically imitating foreign mathematical practices, aiming to modernize the country's education system, which prevents our newcomers—teachers, students, teacher educators, and other stakeholders—from becoming familiar with our own practices (Shrestha, 2008). We are becoming sideline spectators and unconscious consumers of mathematical knowledge. In this regard, I have realized that exploring existing practices is not enough to bring a transformative shift in ME toward more inclusive and empowering practices. For this, we need to envisage an inclusive mathematics curriculum that deconstructs the disempowering notion and might pave the path for inclusive ME. In this context, I have featured an inclusive mathematics curriculum under three broad categories: curriculum as/for extolling Zoe, Eco, and Techno vision; curriculum as/for cultivating spiritual consciousness; and curriculum as/for transformative praxis.

Curriculum as/for Extolling Zoe, Eco, and Techno Visions

When I critically examined ME through in-depth critical self-reflection and dialogical engagement with my research participants, I came to realize that any form of binary discourse—east and west, local and global, pure and impure, inductive and deductive, practical and theoretical, center and periphery, nature and human, to name but a few- is not empowering and mindful (Luitel, 2013). In my opinion, binary-opposite thinking, arguments, and logic lead to an exclusive corner in which two seemingly opposite constructs collide, defeating and negating one another to establish their own superiority over the other. However, I am also mindful that, without critiquing each other's disempowering, dominating, and dishonoring attributes, it is

challenging to transform deeply rooted mindsets, schemas, and meaning perspectives (Mezirow, 1990, 2012). It appeals to me to contemplate envisioning an inclusive ME.

A notion of inclusive ME denotes a rational balance among the different constructs, in which practitioners feel empowered, because their voices, values, and ways of seeing and knowing mathematical knowledge and being in the world are acknowledged. Likewise, it conveys the meaning of respecting, preserving, and nurturing all other forms of non-human life, nature, and ecology that are interdependent (Coles et al., 2024). They are codependent and coexist in ways that their independent existence seems impossible; however, modern ME programs have rarely incorporated these issues. In this scenario, I have tried to embrace the Zoe, Eco, and Techno visions to foster an inclusive mathematics curriculum.

I have used Zoe as a metaphor for all non-human creatures on Earth; some of them are on the verge of extinction due to the overexploitation of nature by human beings, backed by modern education in general and Western Eurocentric ME in particular. Moreover, Western Eurocentric ME helps develop conceptions of unidimensional thinking and analysis that support the establishment of the superior position of human beings, particularly Western humans (Valero, 2023), over other non-human creatures and nature. Likewise, I conceived the term 'Eco' as a dialectical relationship and interplay among humans, other living beings, and non-living objects for their well-being and prolonged existence. These two constructs—Zoe and Eco—have been taken from Eastern perspectives, in which each is equally acknowledged, valued, and highly respected as an in/visible source of power and is revered as a different form of God/Goddess (Krishnakripamaya, 1997). The third construct, techno, has been referred to as the symbol of the modern development of sciences, information and communication technology (ICT), engineering, and ultra-modern technology in different disciplines that support enriching the prosperity of the society, nation, and the world rather than controlling and exploiting human labour and natural resources for the temporary benefits of the elites who are in power. I believe these three powerful metaphors will undoubtedly contribute to the design of inclusive mathematics curricula in schools and universities. In this regard, I have articulated my vision in the following verse.

Curriculum as/for a sacred flexible vision of learning flight,
Student and teacher taking flight screening natural light.
Trigonometry, Vector and Calculus, tracking angle, direction, and rate,

Geometry and Algebra tracing the path and resolving the right tract.

Curriculum as/for an inclusive place for germinating equity,
Igniting axio-onto-epistemic notion for enhancing curiosity.
Valuing Zoe, the spirit of life, where every learner thrives,
Dancing with realms of empathy, where every voice derives.

Curriculum as/for an incubating center for flourishing diversity,
Rejoicing in the beauty of heterogeneity in natural propriety.
Acclaiming an Eco with cooperative and collaborative zeal,
Learners reveal the beauty of mathematics as they feel it.

Curriculum as/for echoing the ecological magnification,
Celebrating the coexistence through solidification.
Nurturing all lives and environmental divinity,
Extolling the sovereignty of others without harming one's dignity.

Curriculum as/for a garden of technological flourishing,
Nourishing the visions for holistic sustainable upliftment.
Designing the technological tools for beautifying the earth,
Preventing the sixth extinction by respecting all lives perch.

Aligning with these views, Surya portrays that our ME curriculum is *not embedded in our land, history, and perspective (philosophy/tradition). We, as the Nepali people, have not only acknowledged diverse sociocultural groups residing in our native land but also have an inseparable relationship with other non-human beings and nature—ecology, environment, and soil. If we contemplate our rich historical practices, we find that our ancestors revered the animals—snakes, dogs, cows, crows, frogs, etc., worshipped rivers, ponds, nature, hills, mountains and water taps, admired trees—Bar and Pipal, and adored medicinal plants—Tulasi, Chiraito, Harrow, Barrow, Panchaaule, Amala, Yarsa Gumba, to name a few. I found that our ancestors were/are highly aware of the interconnectedness and interdependence of human beings and the rest of the earth (Planet). They respect all living beings other than humans (zoes), acknowledge all forms of life (bios), and nature. They seem to recognize their interdependence and coexistence (eco), which helps cultivate a celestial vision to promote peaceful, prosperous lives. Our historical practices seem to be harmonious with nature (zoe & eco). Gradually, we have become human-centric because of the enduring influence of modern education. We have started to think that*

natural and ecological resources, including the lives of other living creatures, are only for human consumption.

At the same time, our schools and universities uncritically adopt the agendas of modernity and support the erosion of our historical notions of interdependency, coexistence, and mutual respect for all life on earth and for nature. It is an enduring effect of modernization and the political-economic agenda of the global north and developing countries (GNDC) in our political systems and other subsystems, including education. The GNDC instigates different political-economic policies—capitalism, liberalism, and neoliberalism that give major priority to a global market for the sole aim of making a profit and developing a habit of consumerism. To make profits, GNDC has developed a mechanism to control and exploit not only the people residing in GSTR but also the natural resources available there. It further exacerbates the power imbalance between GNDC and GSTR, creating significant disparities in consumption, wealth, and technology between the GNDC and GSTR people. After that, they began using their power and privilege to dominate the axio-onto-epistemic practices of GSTR.

In this scenario, you (indicating me) need to critique both aspects: the colonial mentality of GNDC, in which they exploit the majority-minoritized people of the world and natural and ecological resources for their undue profit. You also need to be mindful of the role played by the petty-bourgeois of the GSTR, who have been educated by colonial power centers through different scholarship schemes, invisibly aiming to control the people through the erasure of their language, onto-epistemic positionality, and their values and norms. The colonial power centers wisely prepared small groups of petty-bourgeois in GSTR so they could rein in the education policies and curricula of the respective countries and align them with the vested interests of the colonial power centers.

In my opinion, to revive ME in the direction of inclusiveness, authenticity, and empowerment, it is not sufficient to include the voice of the majority of people who are marginalized, but we should be mindful of the context, land, immediate environment, life of zoes, and ecological surroundings so that the practitioners from the respective region can take a sole authorship and ownership of their learning. When mathematics becomes inseparable from history, politics, ecology, and biocultural diversity, then it enables the learners to explore contemporary issues of social injustice, economic disparity, asymmetric power dynamics, environmental degradation, loss of biocultural

diversity, and ecological collapses, to name a few that might open a new avenue in the field of ME.

During the discussion on alternative curriculum practices in ME schools and universities, Chandra also addressed technological issues in contemporary ME, including the above agendas. *He reported that one of the significant problems in our mathematics is the technological issue. To date, most mathematics classrooms, as I have experienced as a student, teacher, teacher educator, and researcher, seem to be dominated by a telling pedagogy because our curricula have not incorporated locally developed technologies. I found that there is a particular narrative among school and university teachers regarding the inclusion of technology. Most teachers have indicated that the lack of infrastructure and the limited availability of technology are the major obstacles to integrating it into mathematics pedagogy. It is partially true. In my observation, there are three types of problems. Firstly, teachers could not recognize the locally available techno-cultural tools that are easily accessible to teachers and students. Secondly, they lack the knowledge and skills to use these technological tools that can facilitate mathematics learning. Last but not least, teachers always want to remain within their comfort zones.*

To use locally available technology, teachers need passion and devotion to their profession, which enables them to integrate it into mathematics classrooms. It is lacking among our teachers. I do not want to blame teachers only; our education systems have not been oriented in this direction. There is also a lack of teacher autonomy in schools and universities. Teachers were/are prepared so that they can perform their routine duties. There is scarce space for engaging in creative, critical, and innovative activities because our system undoubtedly promotes a testing culture in which teachers and students are implicitly urged to reproduce the mathematical knowledge. In my opinion, we should not delay incorporating technological tools into the mathematics curriculum. In so doing, we first need to focus on developing locally available technology and encouraging our younger generation to enhance it further. Likewise, we need to be mindful of the use of advanced technology in mathematics classrooms, considering its pros and cons. We need not be colonized by the techno-cultural tools. That is, my argument is that we need to focus on developing human resources capable of producing nature-friendly technology that also promotes our values and perspectives. It would only be possible if we could liberate our universities and schools from hegemony.

The narratives of my research participants and my experience indicate that ME needs to be transformed by incorporating current glocal issues from zoe, eco, and techno perspectives. The eco, zoe, and techno vision of curriculum incorporates the notions of coexistence, codependency, interrelatedness, and mutual respect in which practitioners act as active agents of a larger system (Henderson, 2015). A concept of mutual respect and an empathetic view further support the reversal of hierarchical systems that position humans over nature, eco and zoe, and some humans as supreme over others (Burroughs & Bellino, 2024; Martusewicz, 2018). An agentic engagement of learners in the learning process can help explore the cultural, political, and economic forces that underpin and perpetuate unjust practices and beliefs (Tuners & Donnelly, 2013). It allows for recognition of dominant systems and forces that have in/visibly shaped the deficit view and damaging practices (Lupinacci & Happel-Parkins, 2016), further enhancing the critical thinking.

In this regard, my argument is that the relational approach to seeing and acting in the world encourages the learners to engage in contextualized learning and seek solutions to real-world problems while deconstructing disciplinary egocentrism. It helps foster eco-consciousness and eco-justice among practitioners (Burroughs & Bellino, 2024; Lupinacci & Happel, 2016). Likewise, recognizing and valuing relational realities encourages learners to work collaboratively, which is vital not only for the problem-solving process but also for enriching ecojustice practices (Bowers & Martusewicz, 2009).

An ecojustice curricular perspective begins with recognizing and valuing relationality and codependency as the critical components of all living creatures and the rest of nature. According to Buddhist tradition, nothing and no one comes into being outside of one's relationship with something else (Martusewicz, 2018). *Nagarjuna*'s concept of co-arising and negative dialectic rejected the notion of an essentialist view and acknowledged the impermanence and dynamism of reality as a process of becoming, thereby denying any worldly categories (Westerhoff, 2009; Lamichhane & Luitel, 2023b). Similarly, the *Advaita Vedanta* introduces the concept of neti-neti (not this, not that, neither this nor that), in which there is no space for dualistic logic that favors one over the other (Davis, 2010). It teaches us that there is no binary opposite among the different perspectives and phenomena; each complements the other. For example, humans over nature, humans over non-human creatures, the West over the East, and mind over body. Dualistic thinking and acting

led to a darkness in which learners rejoiced in an illusory, apparent reality that kept them from exploring the eternal reality and restricted them within superficial, airy-fairy romanticism (Hirst, 2005). Both *Advaita Vedanta* and *Buddhist* perspectives portray us as part of complex, generative systems. We are in the process of becoming each other, in which human beings, zoe, and eco coexist, helping develop an empathetic vision among practitioners.

The development of empathetic generative system promotes the conception that human beings are the agentic actors within the broader systems of the earth, which helps dismantle the myth of individualism and competition emerged from the West that grips our culture, feeds us lies about short-term happiness and success through accumulation of wealth and goods for insidious consumption undoubtedly violates the communal practices and mutual respects essential for our collective living (Martusewicz, 2018). The agentic actors should take responsibility by recognizing the intricacies of human beings, other living creatures, and nature, thereby fostering ecojustice scholarship.

The ecojustice curricular approach challenges both anthropogenic destruction of the earth for the fulfilment of their greed and lust, abuse of political power and neoliberal economic policy—a product of the colonial mentality of the GNDC, which results in the ecological catastrophe, environmental degradation, and global warming that negatively affect the lives of the poor people of GSTR and well-being of the mother earth (Irving, 2019). The hegemonic systems of power and oppression materialize both the exploitation of human beings over nature and the domination of the GNDC people over other people. Likewise, it further supports the degradation of ecosystems and the health of the earth, which threaten not only human life but also the lives of all other living creatures and the well-being of the planet. This discourse signifies that we live in precarious and challenging times due to the effects of climate change and the growth in inequality between and among the countries of GSTR and GNDC and their people. Un/knowingly, human behaviour pushes our planet toward an ecological catastrophe, and the earth gradually becomes uninhabitable for humankind and all other living creatures (Griffiths & Murray, 2017). At the same time, we are rejoicing and unknowingly give consent to the hegemonic structure of modernity and neoliberal political-economic order, in which humanity is plagued by profound injustices both locally and globally, across cultures (Oxfam, 2019b).

This discourse illuminates the significance of ecojustice perspectives in the contemporary education system, which reinforce the ethic of care for the well-being of the planet, ecosystems, all life on Earth, and nature. It supports the development of attitudes and practices of tolerance and compassion, further enhancing sustainable ways of seeing, knowing, being, belonging, and acting. Likewise, the ecojustice perspective promotes a collaborative and cooperative culture rather than competitive and individualist greed that ensures the equitable sharing of the world's resources and responsibility of enhancing the sustainable practice that makes the health of the earth and planet suitable for humankind and all living creatures (Irving, 2019; Joseph, 2018; Khaksar, 2020). It signifies that humans, animals, plants, and natural resources coexist within the same ecosystem, each possessing unique perspectives that are equally significant and influential in maintaining the well-being of all systems and the earth (Forero, 2015). It suggests embracing emerging, political, historical, and contextual ways of knowing in the formation of mathematics curricula, including the contemporary burning issues of global warming, environmental degradation, ecological damage, and loss of biocultural diversity (Luitel, 2022; Taylor & Taylor, 2019; Wolfmeyer et al., 2017).

In this connection, Barwell (2013), D'Ambrosio (2010) and Skovsmose (1994, 2023) argued that the uncritical implementation of modern mathematics as a discipline is responsible for promoting neoliberal political economic agendas result in anthropogenic disturbance of health of mother earth occurs in the form of climate change, environmental degradation, loss of habitats, ecological damage, loss of biocultural diversity, a name but few.

At this stage of my inquiry, I have realized that it is necessary to shift practitioners' thinking, beliefs, values, and convictions, which constitute their mental structures or schemas (Mezirow, 1991, 2012) that govern their actions. The mathematics curriculum should enrich inclusive views and values that recognize human beings, non-human creatures, the environment, ecology, and nature as equally significant contributors to the collective well-being and health of the earth. At the same time, the contemporary disciplinary, egocentric curriculum that promotes scientific literacy and numeracy seems unable to address the current global crisis of climate change, environmental degradation, ecological damage, and the loss of biocultural diversity (Kahan et al., 2012). In this regard, as mathematics educators and practitioner researchers, we must raise the questions about the role of ME in schools

and universities. Why have the issues of climate change, ecological damage, loss of biocultural diversity, and environmental degradation not been incorporated into ME? Why do mathematics educators become external spectators of these issues?

Many mathematics educators and researchers (Frankenstein, 1994; Gutierrez, 2013; Gutstein & Peterson, 2013; Wager & Stinson, 2012) have argued that it is too late to integrate issues of social, cultural, historical and political, ecological, environmental and climate change, biocultural diversity and sustainable development (Coles, et al., 2024; Radakovic et al., 2018; Wolfmeyer et al., 2017) in ME to engage learner in the intricacies of the 21st century global crisis aiming for resolving these issues. But why has it not happened yet? It is due to the lack of an ecocritical perspective in ME.

A sociopolitical perspective in ME will enable practitioners to explore the domination, oppression, and supremacy of neoliberal thought, global economic hegemony, and the systemic configuration of power, which encourages them to struggle against such ruthless practices (Gutierrez, 2013, 2017), while ecocritical discourse encourages them to be mindful and responsible regarding current issues of climate change and biocultural destruction. The colonial power centers, or more precisely, GNDC, do not want to lose their supreme position and continue their domination—which Hard and Negri (2009) radically expressed as empire—at the center of educational endeavour of the world controls pedagogy and research in mathematics and other disciplines as well to continue their brutal domination. Against this backdrop, the zeo and eco vision of curriculum offers new perspectives to address both types of global crises: sociopolitical, biocultural, economic, ecological, and natural support, fostering ecoconsciousness and ecojustice praxis.

At this stage of my inquiry, I have concluded that the zoe, eco, and techno visions of the mathematics curriculum support fostering eco-consciousness among people by developing a way of relational thinking and sustainable actions. In so doing, we need to develop technology that harnesses and promotes these visions rather than extracting nature, other living creatures, and non-living objects for the benefit of human beings. In this connection, postcolonial and ecojustice perspectives, in which both recognize and value epistemological plurality over epistemic arrogance that one's ways of knowing are superior to others, and teach us to learn to see ourselves in relation to the broader systems of the earth (Andreotti et al., 2011). At last but not least, I have claimed that ME of the 21st century must develop the zoe, eco, and

techno vision for developing interrelationship, interdependence, and coexistence among human beings, non-human creatures, nature and the broader ecosystem by means of fostering empathy, beauty, compassion, tolerance, equity and non-maleficence (Wolfmeyer et al., 2017) attributes among the practitioners through the integration of green technology that favors the above attributes rather than anthropogenic arrogance.

Curriculum as/for Cultivating Spiritual Consciousness

Mathematics education, whether in school or university, seems isolated not only from the country's sociocultural, historical, and political landscape (Lamichhane, 2019) but also from a learner's spiritual traits. Learners' lives are programmed by schools and authorities accordingly, as they feel is essential to learners' development (Miller, 1999). I was confused about whether I was a living being with senses, emotions, compassion, cognition, affection, and spirit. Why has the education system treated me as an object? Are there any places in the ME curriculum where learners can find recognition for their values, emotions, ethics, compassion, and spiritual belonging for the well-being of the planetary earth? Can we imagine human beings without having these attributes? These are some of the questions that compel me to explore the spiritual dimension of ME.

I have used the term spiritual consciousness in this subsection, which differs from specific religious dogmas and denominations. Spiritual consciousness may be a way to strengthen the empathetic vision, relational coexistence, and mutual respect of the self and others (Gutiérrez, 2022). I have conceived the term critically, recognizing the roles of power in educational settings (Dei, 2002). The spiritual practices of GSTR: relationality, ecojustice, empathetic and revering nature as the source energy, and complementary of human being and all other living creatures (Gutiérrez, 2022; Shiva, 2005), are negated, devalued, and marginalized by the Western-modern philosophical tradition and scientific rationalism. I do not mean to negate Western-modern knowledge and scientific thought entirely, but we must be aware of their dominant presence (Dei, 2002). As a Nepali mathematic educator and researcher, I am highly enthusiastic about protecting and promoting Nepali local cosmological knowledge systems and ways of knowing that help connect local knowledge with global knowledge systems. In this connection, the critical astuteness of spiritual wisdom, spiritual knowing, and spiritual consciousness has challenged and resisted the colonial legacy pervasive in the neoliberal educational setting (Dei, 2019). The neoliberal

educational setting has dislodged Nepali learners from their land and values, and ways of knowing and being.

Many researchers (Dei, 2002; Miller, 2002; Palmer, 1998) have claimed that education that is not embedded and embodied in the land, society, culture, and history, a host of ways of being, knowing, and doing, spiritual belief, and philosophy of life, becomes dry, abstruse, and lifeless. Learners become uninterested and feel isolated because their land, society, culture, and history are excluded from their formal education. It is one of the primary reasons for the formation of negative images of mathematics among practitioners (Lamichhane, 2019), which negatively influences the learning culture among students and teachers (Lamichhane & Luitel, 2022). In this context, I have conceived spirituality as a crucial aspect that ignites the emotional, affective, ethical, and contemplative dimensions in education, which are essential and inherent to human existence and planetary well-being and should be included in educational settings (Miller, 2002; Palmer, 1998). In this regard, describing the ignorance of the spiritual dimension in modern education, in general, and ME in particular, one of my research participants, Durga, narrated her story as follows.

At the very beginning of early-grade ME, when the children have just entered the classroom, they were and still are taught to compete with their friends to be champions, which contradicts the Nepali sociocultural and historical roots of the ways of collaboration and empathy. As an insider practitioner of one of Nepal's indigenous communities, I know that most social, cultural, and historical practices are based on collaboration, cooperation, and mutual respect, and on the acknowledgment of diverse knowledge, skills, and concepts, irrespective of sociocultural and economic backgrounds. People in our community exchange and share their knowledge, skills, and ideas to meet their livelihood needs, with the intention of supporting people in need rather than defeating them through competition. Our parents, senior people, and community leaders always teach us that it is our ***Dharma*** *to create a peaceful environment in society through mutual respect, empathetic relations, collaborative practices for the common good, and help solve daily-life problems. They also remind us that to hurt others' feelings, emotions, and religion is a great sin. In addition, they make us aware of the importance of preserving water springs, rivers, streams, hills, lakes, ponds, forests, wetlands, and other living creatures by illuminating these components as our lifelines. I have realized that our ancestors held spiritual beliefs that acknowledged the roles of all living creatures and non-living objects as*

inseparable components that make the existence of the earth possible. I have had an opportunity to observe and learn all of this valuable knowledge and concepts through storytelling, folk songs, maxims, adages, metaphors, and social dramas, which are performed during special festivals: - new year, Daishain, Loshar, different ritual customs/ceremony, that make me familiar with local knowledge, its values, ways of knowing, being, and doing.

Moreover, I found that the ways of knowing and doing embedded in our soil, culture, and history can address the emotional, affective, and ethical dimensions of individual learners, further supporting the bringing forth of spiritual feelings and vice versa. Unfortunately, what I have experienced during my three decades of journey in ME is that we have been taught to compete with and defeat colleagues, and to control and rule over other living creatures and nature for individual, materialistic benefits. In my opinion, it is one of the most significant factors that induce the present environmental crisis, violence, and war that plague contemporary society, nations, and the world.

Aligning with the above arguments, Surya also critiques existing mathematics curricula in schools and universities and offers an alternative vision. *Surya portrays that the existing mathematics curriculum in the context of Nepal and possibly throughout the world seems to fail to capture the learners' emotional, ethical, affectional, and contemplative traits of learners that prevent nurturing the outset vision of Hindu philosophy—Vasudaiva Kutumbakam (the world with all its living creatures is one family), Ahimsa Paramodharma (non-violence is the highest duty in life that promotes the practices of mutual supporting to all living beings) and Prakriti (nature) as inseparable, active, inherent and productive energy for creation, renewal and sustenance of all life in the earth. Moreover, Prakriti is itself a preserver and reservoir of all living beings and non-living objects.*

Moreover, you (indicating me) should not be confused by the plethora of programs that have been launched for developing a peaceful culture, an essential component of the spiritual consciousness; still, they focus on official peace that largely orients to prevent physical violence and other forms of violence, cultural, structural, ecological, etc., are hidden. Astonishingly, to date, I have not found ME curricula in schools or universities that are oriented to explore the forces behind the subtle form of violence. In my opinion, it is because modern mathematics focuses only on technical or scientific rationality that devalues all other forms of reasoning/knowing, which are

non-linear and do not align with so-called standardized reasoning/knowing. Our ancestors used folklore, fables, metaphors, poems, stories, and maxims as methods of knowing, which are embodied in the soil, history, culture, and ecology, and emerged from experiential experiences. My argument is that such forms of reasoning/knowledge support the concepts of mutual respect, compassion, kindness, interconnectedness, interdependence, and the coexistence of humans, non-human beings, and nature. These can flourish only through the ***Ahimsatmak*** *attribute, which supports the sprouting of spiritual consciousness, and vice versa. For example, we can easily teach collaborative thinking and promote mutual respect through number systems.*

The individual digits have their own numeric values; when they collaborate, their values become extremely large. Let us take two different digits, 2 and 9. When they remain separate, their numerical values are 2 and 9. When they combine, they will create 29, 92, $2^9=512$ *and* $9^2 = 81$*. What would be the results if we started to teach in this way rather than teaching only the structure of numbers without having any relation to real-world problems? It not only enriches the collaborative culture among practitioners but also fosters a culture of mutual respect and interdependence, creating greater value. It also teaches us that individual effort is not enough to produce better results in society and the nation; we must acknowledge others, regardless of their values. The independent value of zero in the number system is meaningless; when it combines with other digits to the right, it increases the value of those digits by a multiple of 10. It means that we do not devalue, ignore, dominate, or discard others by recognizing their independent existences and identities. From this example, we can teach children moral, ethical, collaborative, empathetic, and* ***Ahimsatmak*** *values that can help enhance peace in society, the nation, and the world at large. In this connection, my argument is that hurting individual feelings, identities, culture, or language; exploiting human beings, nature, or ecology; and any form of supremacy are subtle forms of violence that have significantly affected human beings, nature, and the earth. Last but not least, developing spiritual consciousness is not only necessary but also essential in this burgeoning* 21^{st}*-century world, which opens up a holistic vision that allows us to recognize, respect, and create an environment for the sprouting, flourishing, and nurturing of diversity.*

From the above narratives, I have realized that nurturing the spiritual consciousness among school children and adolescents is necessary because it is an

integral part of human beings that helps connect seemingly conflicting constructs such as mind vs body, competition vs collaboration, individual vs societal, spiritual vs materialistic, human vs non-human beings, human vs nature, profit vs prosperity, individual greed vs collective good etc., and hence emphasis on developing holistic vision in education (Pulido-Moyano, 2023). Spiritual thinking and knowing in a curricular context focus on exploring the fundamental questions of life—what is the purpose of life, what is the role of human beings in the universe, what is the role of ethical or moral values of human beings, how can we purify the mind and body, and how can we deal with human suffering and ecological and biocultural damages. From this vantage point, to be educated means not to restrict receiving or accumulating information about the material world to graduation, but must address the above issues in the course of one's life.

Competition in ME undermines spiritual thinking, as it focuses on winning over others rather than on collaboration and the well-being of society. When education primarily focuses on competition and achieving outstanding results, it creates stress and pressure on learners, thereby reducing collaborative learning and a culture of sharing (Gerasimova et al., 2021). In addition, it creates a fear of failure and can discourage students from engaging deeply in creative and innovative activities. It signifies that a neoliberal educational setting, a mutated form of colonialism, teaches us that competition and success are necessary in the present 21st century, burgeoning, globalized world for the fulfillment of worldly desires. In doing so, the neoliberal setting in education focuses on individual freedom but silences the inequalities resulting from the accumulation of wealth and resources over the historical period of colonialism, the slave trade, the exploitation of natural resources, and the marginalization of the majority of people in GSTR (Piketty, 2020).

Moreover, this discourse signifies that it is necessary to foster the spiritual consciousness among the young generations through school and university education that supports fostering collaborative spirit, compassion, and love, healing wounded humanity, nurturing nature, building the capacity of tolerance and forgiveness, preparing conscious citizens, and encouraging them to be involved in righteous activities continuously. At this juncture, Khagurov and Ostapenko (2011) strongly argue that if the spiritual dimension fadeout from education and competition, efficient, economic rationality and profit motives drive educational institutions, societies and nations that do nothing for transforming the society into peaceful, livelihood and

homeliness but prepare the grounds for perfect corruption schemes, in which a competent lawyer works for the mafia for his/her benefits that ultimately leads to the destruction of the nations. That is, the neoliberal educational setting overlooked the importance and necessity of fostering genuine cultural cultivation. Genuine cultural cultivation can be fostered only when we incorporate the spiritual dimension in mathematics curricula at schools and universities.

The spiritual dimension in ME focuses on fostering a culture of respect, enriching ethical values, developing attitudes of tolerance and forgiveness, and forming a holistic vision of nature, society, and humanity. The metaphor of culture of respect in the context of ME illuminates the inclusiveness, recognition, and acknowledgement of multiple roots of the history of the development of mathematics (Joseph, 2011) and ME, plurality of mathematical reality and diversified ways of knowing and doing irrespective of belongingness and backgrounds of learners—ethnicity, culture, gender, continent, economic status, etc. (Lamichhane & Luitel, 2023a). It can be possible only when our ME, from the very beginning of school education to university education, fosters tolerable and resilience ways of thinking and doing and empathic ways of seeing others so that learners should feel and internalize other people's pain, sorrow, happiness, prosperity and always focus on societal well-being rather than indulging for the fulfilment of individual desires and pleasures (Chapman et al., 2024). It signifies that the spiritual traits in ME are not derived from a particular religious dogma and are not traditional ways of reasoning, thinking, and doing. In this regard, many researchers (Bahchieva, 2017; Bazarova, 2019; Korolkov, 2006; Shirshov, 2020) have argued in favor of developing spiritual and moral values among the practitioners for enriching the humanitarian perspectives that help create a harmonious environment in which all humans and non-human creatures live their respectful and dignified lives for the sustainable future of the planet Earth (Joseph, 2018). It means that the spiritual setting in education teaches us to recognize and value all living beings and non-living things in nature empathetically in such ways that support for sprouting a vision of kindness, equanimity, admiration, humility, trustiness and non-violence for the well-being of society, healing of wounded humanity, preserving the ecology and biocultural diversity for the sustainable future of the planet earth (Lamichhane & Luitel, 2023b; Taylor & Taylor, 2019).

We have witnessed the present global crisis—loss of biocultural diversity, environmental degradation, drought, famine, and physical violence through armed

forces and deployment of ultra-modern weapons. Some of the postmodern curriculum thinkers (Pinar, 2004; Slattery, 2006) and postcolonial thinkers (van Stam, 2017; Young, 2016) have argued that the present crisis of the world somehow related to the so-called modern education system because it has not focused on exploring the root causes, consequences and effects of modernity, hubris of neoliberal capitalist globalization (De Munck, 2020; Piketty, 2020; Sklair, 2020) and narrowly conceived nationalist movement. The neoliberal capitalist political-economic system in the so-called developing countries advocates market-oriented education grounded in economic rationalism, in which the primary goal of education is to produce efficient and skilled human resources aligned with the profit motive of corporate business houses and industrial needs (Regmi, 2024; Schneickert, 2018). It helps dislocate the education from the social, moral, and spiritual values (Gutiérrez, 2022), weakens the public good of education in general and ME in particular (Giroux, 2020b), and promotes the elitist views that reject the diversity of knowledge, practices, ways of knowing, and substantial livelihoods of the Othered people from GSTR.

In this connection, the *Vedic* tradition holds that both humans and non-humans should flourish together for a harmonious, peaceful living environment on planet Earth. Human beings, non-human creatures, and any elements in nature, including mountains, rivers, hills, sea, streams, ponds, stones, soils, rocks, air, water, etc., are constituent forces of life and thus should have respect for dignified presences on this earth. It is possible only when people adopt *Ahimsa* as their guiding principle in their day-to-day thinking and actions. From this perspective, *Ahimsa* does not connote physical violence only. It consists of all kinds of violence—exploitation of human labours and natural resources, encroachment on other species and lands, running out of righteous *Karma*, suppression of other voices, hating of other cultures and history, destroying and damaging of liveliness environment and ecology and accumulation of unnecessary wealth and property for the personal comfort and cosmetic decoration to satisfy individual worldly desires and greed (Fergusson et al., 2018; Singhvi, 2006).

Moreover, from the perspective of *Jainism*, non-violence consists of different aspects of recognition, admiration of all other non-human beings and nature for enhancing the conception of mutual respect, plurality, nurturing, healing, tolerance and forgiveness, which are summarized by Singhvi (2006) into five guiding principles as (1) *Ahiṃsa (अहिंसा,* non-violence)- respect humans, non-human creatures, all form of living being and rest of the nature having non-exploitative, non-killing, non-destroying

and harmonious thinking and actions (2) *Parasparopragraho jīvanāma* (परस्परोपरोग्रहो जीवनाम्, interdependence and interconnectedness)- internalize the values of existence and universal interdependence of all things in the universe (3) *Anekāntavāda* (अनेकान्तवाद, the diversity of truth)- doctrine of plurality of reality or truth (4) *Samyaktva* (सम्यक्त्व, equanimity)- pertinence and hence opposition to intolerant, inflexible, harmful, aggressive, and unilaterally dogmatic attitudes to the natural and human-made world (5) *Jīva-daya* (जीव दया, compassion)- represents the need for compassion, empathy, charity, and *Vasudaiva Kutumbakam*.

In addition to the above principles of *Ahimsa* (non-violence), *Jainism* teaches us not to take the main aim of one's life to make accumulation of wealth for personal consumption, eschew human frailties such as greed, pride, conceit, rapacious desires and deceit, not be the causes of pollution, extinction of species, and the destruction of forests and wildlife which are crimes against the earth and humanity. It means that we need to choose a path of *Nyaypatta-dhana* (न्यायपथ धन)- legitimate means of livelihood, devote life to *Seva* (सेवा)- serve, care, and nurture the helplessness, nature, humans, and non-human creatures, and offering *Dana* (दान) to serve the common good of the communities (Tatia, 2006). Unfortunately, what I have experienced during my four-decade journey with ME as a student, teacher, teacher educator, and practitioner-researcher, I have rarely found such qualities integrated into the mathematics curriculum.

The above discourse signifies that mathematics educators need to be mindful of preparing the young generations in which they are taught not to be highly indulgent, not to have a hateful mindset, not to create a fearful environment, but to respect the dignity of all and to promote the vision of *Vasudaiva Kutumbakam and Ahimsa Paramodharma, which helps* make the peaceful lives of all living beings (Dei, 2002). In this context, the United Nations General Assembly sets sustainable development goals to be achieved by 2030, incorporating five "P" (People, Planet, Peace, Partnerships, and Prosperity) to achieve meaningful and dignified lives for all and for the planet (UNESCO, 2017). The indication is that the education system, in general, and ME, in particular, must incorporate the principles of the five "P" because mathematical thinking and reasoning can establish interconnectedness, interdependence, and coexistence among them. In so doing, we need mathematics curricula that should drive practitioners to engage deeply in exploring the inseparable nature of these five "Ps" for the sustainable future of the earth. It should be possible

only when we mindfully embrace the mathematics curricula in the soil, history, nature, culture, socio-political landscape, and spirituality of the people. It signifies that mathematics curricula should bridge the gap between theory and practice, enabling practitioners to readily demonstrate their mathematical knowledge, skills, and concepts through real-world examples, and thereby becoming change agents.

Curriculum as/for Fostering Transformative Praxis

In this section, I have used praxis as a guiding metaphor rather than a principle and framework to invite my readers to engage deeply in critical reflection on their practices, aiming to transform the existing oppressive ME into a more inclusive and authentic one. It is because if I were to provide certain frameworks and principles that have immediately emerged from my own experience and interaction with my research participants, as intersubjective, dialogical, and somehow dialectical ways of knowledge construction that could not fit in another context, place, or time.

In this regard, I have used praxis as a contextual, situational, and inclusive metaphor that helps illuminate and offer an alternative—trans/inter/multidisciplinary, empowering, and harmonious—vision and actions. Moreover, I have taken praxis as a way of seeing, knowing, engaging, and acting with the world rather than acting upon the world through ongoing actions and reflections to instigate a paradigm shift in ME and then social change in a way that overcomes dominant and oppressive social and institutional structures (Freire, 1993). Now, I turn my attention to how my research participants articulate their experiences and my experiential experience, enabling me to capture the essence of curriculum as/for transformative praxis.

After exploring the dominant features of ME in the Nepali ME landscape during our discussion, I asked my research participants to share their experiences on how ME can be transformed. In response to my query, all my research participants have indicated that ME practices in Nepal are suffering from negative narratives arising from decontextualized curricula, transmissionist pedagogy, and disempowering assessment systems that restrict learners to predefined tasks removed from their lifeworlds.

In this regard, Bishnu has portrayed his ideas on an alternative curriculum. *It is not exaggerated to say that ME is shaped by a bureaucratic mindset in which the major stakeholders (here, students and teachers as practitioners) are not autonomous in bringing their experiences into mathematics curricular activities. I mean that the curriculum, which is underpinned by bureaucratic thinking, assigns predefined tasks*

to teachers and students. As I experienced in my journey as a student and teacher, I repeatedly encountered situations in which there was a general belief among teachers (including myself) that engaging in learning means spending enough time daily solving bookish problems. There are some cases in which teachers focus on developing conceptual understanding by using different manipulative materials and technological tools; however, I have found only a rare instance in which teachers and students engage in reflective practices. As a practitioner-researcher, I have sometimes raised questions about the application and implications of the mathematics taught in schools and universities. I have rarely found cases that serve as satisfactory examples of how to help teachers and students develop critical and creative thinking. For example, in statistics, we can bring many real-world examples into the mathematics classroom; however, our practices, underpinned by textbooks and curricula, focus on instrument questions that require only the application of the formula to arrive at a single answer. The question looks like this: find the mean and standard deviation of the following data (please insert data):

Class interval	*0-10*	*10-20*	*20-30*	*30-40*	*40-50*	*50-60*
Frequency	*7*	*12*	*21*	*25*	*17*	*14*

What types of understanding do you want to develop from such a question? What are the attributes that we want to build in our students? I have never found a case where the teachers and students raise the very nature of such questions. When students solve such questions and obtain good grades (marks) in the examination, we label it as a quality of mathematics. In my opinion, it is an illusion to judge the quality of education based on the grades obtained in three/four hours of paper-and-pencil tests.

From this example, I want to illuminate the vast gap between theory and practice. Theoretically, we can infer that the primary goal of including statistics at the school and university levels is to enable students and teachers to explore, analyze, and address social, economic, financial, and environmental issues for the betterment of society and nations. However, we have un/knowingly rejoiced in the instrumental and mechanical performativity that disrupts practitioners' creative, critical, and imaginative thinking and reasoning, and thus they become uncritical followers and clients of ME.

Another aspect I found when I critically reflect on Nepal's ME practices is that those in power seek to create dead peace in societies and notions by crafting a meta-

narrative of apolitical ME. More precisely, a minority of the ruling class seems to have successfully created a false narrative that all realms of human thought and action can be described through the instrumental rationality of scientific logic. For these reasons, the authorities who enjoy their power and wealth rarely seem interested in designing and implementing emancipatory curricula in schools and universities.

Moreover, we need to incorporate the inter/multi/transdisciplinary conception in ME. Inter/multi/transdisciplinary curriculum practices focus on developing mathematical knowledge and skills along with soft skills, such as communicative skills, critical thinking and problem-solving skills, collaborative skills, creative and innovative skills, citizenship skills, etc., that might help the practitioner to be a conscious citizen so that they can take informed decisions. It helps enrich a relational and cultural understanding of the subject matter and the practitioners themselves, opening a new avenue in ME that supports the view that mathematics is not a neutral discipline.

Likewise, Pawan expresses his views on alternative practices in mathematics curricula as follows. *In our previous discussion, I vented my discontent regarding Nepal's contemporary ME. My disagreement with the existing disempowering and instrumental mathematics curriculum indicates a feature of alternative curriculum practices in our context. However, regarding your inquiry about alternative curriculum practices, it is unnecessary to spend additional time discussing the issue, as we have already covered it in our previous two discussions. Let me express some of my views about an alternative curriculum practice. I don't know whether my views are helpful to you.*

First of all, it is necessary to connect ME with the immediate environment and real-world problems. It resolves one of the problems of a socially, culturally, linguistically, and geographically diverse country like Nepal. When teaching-learning activities in mathematics are based on local social, cultural, historical, geographical, and economic issues, they explore existing social and institutional structures and offer learners an opportunity to critically understand the problems, thereby preparing them to transform the oppressive system.

Secondly, we need to immediately break the highly centralized, top-down approach to curriculum formulation and give teachers the authority to develop the curriculum with students and parents within the broader national/regional framework of learning outcomes to be achieved at certain classes and levels. It gives teachers and

students autonomy, allowing them to take sole responsibility for their teaching and learning activities. It prevents one of the most intractable issues in ME programs: who is responsible for the underachievement of schools in national-level examinations and for developing negative attitudes, beliefs, and images of mathematics that lead students to avoid mathematics in their higher studies.

Lastly, we should be mindful of bridging the gap between local cosmological and global knowledge systems by integrating contemporary national and international discourses in ME. It creates a rational balance between local and global knowledge systems. If we forget our local knowledge, history, culture, language, and onto-epistemic practice, we erase our identity and may lose our land. If you ignore global practices, we remain isolated from the rest of the world, which seems impossible in the current complex and bourgeoning 21st century. In our context, the early grades (grades 1 to 3) curriculum appears to incorporate some of the above attributes; unfortunately, it has not been extended to other grades. It isn't easy to locate whose interests govern our mathematics curriculum.

In a similar vein, Durga briefly and provocatively highlights features of alternative curriculum. She focuses on developing critical consciousness through curricular practices in mathematics. *The mathematic*s *curriculum should provide sufficient space and opportunities to foster critical consciousness among students and teachers, helping them explore problems multidimensionally and prepare them for an ongoing, unpredictable, and rapidly changing world. Developing critical consciousness through education means preparing students to be change agents by avoiding the disempowering notion of ME and empowering themselves and every member of society so they can rejoice in their values, culture, identity, and onto-epistemic practices, and be willing to contribute to the betterment of humankind and Mother Earth.*

From the above narratives of my research participants, I have captured the essence of a praxis-driven curriculum. Initially, praxis was described as a practice prescribed by the theory. Later, praxis is understood as a relationship between theory and practice, expressed in action and reflection. In my understanding, when we neglect action and proclaim reflection in theory, it amounts to empty verbalism, while sacrificing reflection amounts to mere activism (Freire, 2005; Herbel-Eisenmann, 2023). There is a dialectical relationship between action and reflection; each seems to negate the other, yet each enriches the other. Action is informed by reflection, and

reflection is informed by action. It is more important in our mathematical practices, which seem to be lacking in the traditional mathematics curriculum. As a mathematics student, teacher, and teacher educator, I have devoted most of my time to solving the bookish problem at hand without deeply questioning its applications and implications in real-world practice. In this context, Dewey (2001) described the roles of action and reflection in education as complementary forces. If we cannot bring these two concepts into practice, they separate the known from the knower, and learning becomes jeopardized. Without seriously considering these constructs, we focus on actions as the repeated deployment of teacher-given or textbook-induced algorithms to reach a particular solution, which destroys practitioners' creativity, critical thinking, and action (Gutstein, 2006).

My research participants suggest that we can enhance creativity and criticality by creating an environment, through curricular practices in ME, in which teachers and students simultaneously pose questions about their very assumptions regarding mathematical reality, ways of knowing, and valuing. In this regard, we should not view reflection as merely a practice of looking back on the past. There is a continuous cycle of critical reflection—reflection on actions, reflection in action, and reflection for action (Schön, 2017).

Reflection on action supports practitioners in reviewing their practices through a critical lens that poses questions to others and themselves, exploring the positive and negative forces embedded and embodied in ME to improve current practices. Reflection in action also supports improving the present actions within social, cultural, geographical, economic, and political contexts. Reflection for action envisages future action informed by the previous two reflections and practitioners' experiential experiences. Likewise, Johns's (2017) ideas of retrospective, ongoing, and anticipatory reflection, and Schön's (2017) arguments for reflection on, in, and for actions highlight the necessity of integrating reflective pedagogical practices for deep engagement in the learning process. It suggests examining past events to uncover new possibilities. Reflection on ongoing action intends to improve, revise, and modify our immediate activities. Lastly, anticipatory reflection refers to in-depth engagement with contemporary issues and their potential to open new avenues for the wise and conscious handling of forthcoming events (Brookfield, 2017). It indicates that mathematics curriculum practices do not restrict practitioners to the narrowly conceived aims of achieving the prespecified ends.

Mathematical activities within a particular classroom are not "limpid, tranquil and reflective eddies cut off from the river of social, cultural and political life" (Brookfield, 2017, p. 10). It mirrored social, cultural, political, and historical practices (Ernest, 2016b), and many contradictions and conflicts among ideologies, perspectives, material prosperities, etc., exist and need to be addressed. What I have derived from the narratives of my participants is that being a critical reflective practitioner means resolving contradictions and conflicts wisely, in a way that might foster a peaceful and empathetic society, further contribute to the collective good and well-being of Mother Earth. It signifies that critical reflective practitioners are not bound to the improvement of their teaching and learning activities but are also mindful of exploring the disempowering forces—dominant ideology, socially unjust practices, asymmetric distribution of power and resources, etc., for transforming these forces as autonomous and responsible conscious citizens (Grundy,1987; Kemmis, 2008).

The praxis-oriented curriculum liberates students and teachers from a reductionist ideology, which is one of the key obstacles to developing an inclusive and empowering mathematics curriculum (Luitel, 2017). The praxis-driven curriculum is informed by emancipatory human interests, with autonomy and responsibility as the major pillars that help foster practitioners' agency. An autonomous scholarship promotes performative inclusivity, enabling practitioners to bring their scholarship into curricular practices irrespective of their belongingness. Students and teachers have the autonomy to set their learning trajectories and can freely deploy their own onto-epistemic practices in mathematics classrooms. It conveys that the conception of the well-being of society and communal good is the responsibility of practitioners.

An autonomous activity without responsibility might turn into a whimsical action and indulgence towards a particular society, possibly creating a dominant culture in an institution and society. It perhaps disrupts the recognition of the diverse society's voices, values, and perspectives, and prevents empathetic action. Likewise, responsibility without autonomy might lead to insidious actions that could foster a blaming culture within and outside the institution, as responsibility without autonomy is prescriptive, with those in power unduly imposing the obligation for future uneven actions. Moreover, it creates a fearful learning environment, and practitioners consciously remain within their comfort zones.

At this stage, I have realized that the praxis-driven curriculum recognizes the indissolubility of individual and collective emancipation and does not promote

individual emancipation at the expense of collective freedom and well-being (Dahal & Luitel, 2022; Grundy, 1987; Kemmis, 2008). It signifies that curriculum-as-praxis has the form of a continuous dialectical cycle of actions and reflections that emerges in the social, cultural, historical, and political milieus of practitioners, in which they are in becoming rather than as final products of educational output.

Unfolding the insidious effect of longing into a particular order, Milan Kundera (1973, as cited in Kemmis, 2008) argued that "it is a longing for death, because life is an incessant disruption of order. Or, to put the other way around: the desire for order is a virtuous pretext, an excuse for virulent misanthropy" (p. 85). It further illuminates the significant attributes of the emerging flexibility and contextuality of a praxis-oriented curriculum that underpins socialization, not for accepting social and cultural rules as dogma, but with a critical eye and a broader intention for change.

At this juncture of my inquiry, I came to understand that critical consciousness is a way to a social, historical, political, and cultural understanding of contemporary society with self-awareness of being (Freire, 1993). That is, praxis is a way of understanding how social reality is imposed and/or constructed through critical reflective practices and by designing mathematical activities that enable students to act as change agents (Gutierrez, 2017). It helps me understand that praxis can occur in a real world that operates through interactions with the social, cultural, historical, and political worlds, rather than acting upon the world, enabling practitioners to make meanings (Chelsie, 2024; Grundy, 1987; Maseko, 2018; Pillay, 2015). The critical reflection and action within the world, a constructed world, could humanize the learners by enabling them to read and write the world through mathematics (Gutstein, 2006) and help break the notion of a culture of silence (Freire, 1993), which has been instigated through the ignorance of socio-cultural, historical, and political intricacies.

I have realized that developing critical consciousness among practitioners is one of the most significant attributes of a praxis-oriented curriculum, encouraging them to explore and challenge the contradictions and outright lies perpetuated by neoliberal hegemonies. Critically conscious activities support the development of sociocultural, political, and ethical awareness (Stephan et al., 2021). Kokka (2020) also highlighted that the role of critical consciousness in ME underpins understanding of sociopolitical reality, fosters critical civic empathy, and encourages engagement in actions aimed at bringing significant change not only in ME but also at the societal and

national levels. In this context, many scholars (Freire, 1993; Gutierrez, 2017; Kincheloe, 1999; Stephan et al., 2021; Watts et al., 2003) have highlighted the need to develop critical consciousness through ME. It enables students to ask basic questions to deepen their understanding of particular issues and to communicate, thereby changing people's perceptions of those issues, particularly how oppression and domination are taking place in society (Frankenstein, 1994), through the hegemonizing of people's minds.

Hegemony is the state of mind of the practitioners in which there is no necessity for forceful imposition of the ideas or thoughts of one group of people upon another; rather, hegemony is exercised when specific ideas deeply saturate the minds of the people (Apple, 2019; Gramsci, 1971). From this perspective, hegemony is an organized assembly of meanings and practices indoctrinated through the prolonged imitation and/or imposition of the decontextualized curriculum practices (Lamichhane & Luitel, 2023a; Luitel, 2009), a central, effective, and dominant system of meanings, values, and actions in which people are un/knowingly celebrated their subjugation in the name of modernizing education. It is because of the indoctrination of performative audit culture **(**Grootenboer & Edwards-Groves, 2014) in modern education, in which teachers deposit dead morsels into passive and subservient students (Freire, 1993; Gutstein, 2006). The more students focus on storing the deposit entrusted to them, the less critical consciousness they develop, resulting in less or no intervention in the world.

The informative and prescriptive ME has had multipronged effects on our society, nation, and the world, causing irreparable damage not only in the academic sector but also across every sector of society and the nation (Gutstein, 2006), thereby perpetuating a non-transformative mindset among practitioners (Rai, 2022). They have started to celebrate their subjugation and the world's present crisis, which is the result of the past 200 years of anthropogenic activity. In this connection, many scholars (Ernest, 2016b; Frankenstein, 1994; Freire, 1993; Giroux, 2020a; Gutiérrez, 2013; Gutstein, 2006; Skovsmose,1994) have argued that those who are in power implicitly instill the curricula that insidiously create an educational environment in which students cannot develop consciousness and agency. The colonial power center realizes that developing critical consciousness and agency in students is extremely dangerous to them, because it potentially creates a threat to their regime of an unjust world. In

this regard, we need to develop praxis-oriented curricula that foster learners' critical consciousness and agency, enabling them to act as change agents.

Chapter Summary

In this chapter, I have portrayed inclusive curriculum visions of ME by bringing together the concepts of curriculum as/for extolling zoe, eco, and techno visions; curriculum as/for cultivating spiritual consciousness; and curriculum as/for fostering transformative praxis. Firstly, I have envisioned that inclusiveness extends beyond the realm of human beings and encompasses the zoe, eco, and techno perspectives to better the living earth, where all life is possible. In so doing, I have portrayed the inclusive curriculum as one that must incorporate the principles of mutual respect, empathy, interdependence, and coexistence among human beings, other living creatures, and natural phenomena, as well as the role of technology in addressing emerging problems in the complex and burgeoning 21st century. Secondly, I have tried to unearth the role of spiritual consciousness in the recognition and integration of marginalized and othered views in mathematics curricula to ignite the values of *Basudaiva Kutumbakam* through the incorporation of non-Western perspectives on non-violence, nature-cultural embeddedness, and deep peace. Finally, I have offered a praxis-oriented curriculum to foster practitioners' agency, enabling them to work as change agents. At this point, my readers might have questions: what should the mathematics pedagogy be to enhance the features of the mathematics curriculum outlined above? To resolve this query, I have also envisaged a futuristic pedagogy—pedagogy as/for enabling engaged learning, pedagogy as/for developing critical consciousness, and pedagogy as/for planetary well-being by considering the attributes of the mathematics curriculum anticipated in this chapter.

CHAPTER VIII
ENVISIONING FUTURISTIC PEDAGOGY

In this chapter, I have used a futuristic pedagogy as a metaphor to create an open space for readers and practitioners to engage critically with the perspectives and values unearthed by a proposed pedagogy. It is due to recognition of the interconnectedness of pedagogical practices with sociocultural, political, and historical contexts. I am aware that providing a rigid framework and mechanical/technocratic procedures restricts the teachers and students within a trench of expert prescriptions that do nothing but destroy their creativity and criticality, which is one of the major problems of the existing pedagogical practices in ME that I have critiqued elsewhere (Lamichhane, 2020, 2021, 2022). I believe that no signature pedagogy can work as a panacea. In this regard, I have used the notion of futuristic pedagogy to portray an emerging, empowering, inclusive, flexible, critical, and contextual nature that might help transform disengaged pedagogy into engaged pedagogy and also support disrupting the perpetuation of injustice. In so doing, I have envisioned three attributes of mathematics pedagogy, grounded in my lived experiences as an autoethnographer and in research participants' narratives, to enable engaged learning, foster critical consciousness, and nurture planetary well-being.

Pedagogy as/for Enabling Engaged Learning

I have already explored how the pedagogy of ME has been shaped by the colonial legacy, characterized by a traditional, teacher-centric, disempowering, and one-size-fits-all approach that leads to disengaged learning and adverse effects on students' learning (see chapter V). To address the shortcomings of existing pedagogical practices, which are grounded in Western-Eurocentric thought and a neoliberal political economy that hegemonize non-Western practitioners, I have proposed an engaged pedagogy grounded in my own experiential knowledge and my research participants' lived experiences as narrated during our conversations. Now, I focus on illuminating my vision of engaged pedagogy in the following verse.

Pedagogy ignites the mind, body, and heart,
Liberates teacher and student from the dearth.
Students' curious eyes floated on nature,
An engaged learner embarks on making a future.

Pedagogy underpins engaged learning,
Spend cognitive efforts on knowledge earning.
Learners' eyes delve into an ocean of curiosity,
Engaged learner extolls natural generosity.
Pedagogy connects learning to the planet Earth,
Emotional thoughts fuel and accelerate the search.
Students thrive on engaged learning with passion,
An engaged learner feels bliss in learning formats.
Pedagogy celebrates dialogue with free and fair,
Promotes social harmony by encouraging sharing.
Learners build teamwork, a bond so tight,
An engaged learner solves the problems of flying.
Pedagogy unfolds the twenty-first-century complexity,
Enhance transdisciplinary skills to live in simplicity.
Learners delve into bold issues to open new avenues,
Engaged learner celebrates empathetic view.
Pedagogy promotes interdependence and co-arising,
Enhance forgiveness for spiritual passion
Students excavate inner spirits for peaceful lives,
Engaged learning illuminates bounds through
academic, cognitive, social, and spiritual play.

Many researchers (Lamichhane, 2022; Pramasdyahsari et al., 2025; Yeo et al., 2006) have criticized disengaged pedagogy because it emphasizes rote memorization and instrumental understanding in which students become seekers of compartmentalized bits of mathematical knowledge (Rittle-Johnson & Schneider, 2015; Skemp,1976) that erodes the capability of students to think creatively and critically and thus inhibits the ability to solve emerging real-world problems (Vimbelo & Bayaga, 2024). Mathematical pedagogy focuses on instrumental understanding, and mechanical procedures have limited students' opportunities to engage deeply in active learning and problem-solving. Un/knowingly, these disempowering attributes of the pedagogy are underpinned by curricula and textbooks that include very few open-ended questions, thereby disrupting the development of creative, critical, and imaginative thinking and actions. For example, in an aggregate 7%, 90% and 3 % of the algebraic problems in mathematics textbooks of grades six, seven, and eight

published by the CDC, an authoritative government agency for developing school-level curriculum, are found to be related to memorization categories, procedures knowledge without having connection, and procedures with connection with other subjects and real-world problems respectively (Yang & Basyal, 2024). Most pedagogical practices based on these textbooks are oriented toward preparing learners for upcoming monthly, quarterly, half-yearly, and yearly examinations, developing an instrumental understanding, and gaining expertise in deploying procedural approaches to solve bookish questions. The general assumption is that such pedagogical practices enable students to obtain higher marks (grades) in the examination. A unidimensional focus on achieving the highest marks (grades) does nothing but cast a shadow on creative thinking and problem-solving skills.

Creative thinking and problem-solving skills thrive when learners can connect the mathematical knowledge and skill, they have learned to solve real-world problems (Švecová et al., 2014). Connecting mathematical knowledge and concepts to practical situations and real-world examples can bridge the gap between theory and practice. Connecting mathematical knowledge with a broader context in which learners can see and address the interconnectedness of humans to humans and humans to the planet earth (Makrakis & Kostoulas-Makrakis, 2016). It signifies that engaged pedagogy not only encourages learners to invest cognitive effort in solving problems but also supports them in adopting relational, ethical, and emotional perspectives, in which they feel free, enjoy themselves, and are emotionally enthusiastic about connecting with humans and other-than-humans.

The learner's emotional attributes are another aspect that engaged pedagogy considers to address learners' loneliness and anxiety, so they feel included in school and the community. School might become a significant part of learners' lives, providing a sense of belonging and recognition, and its activities are important tools for out-of-school accomplishment (Finn & Zimmer, 2012). It suggests that mathematical pedagogy urgently needs to be liberated from narrowly conceived approaches to imparting compartmentalized mathematical knowledge, to enhance academic achievement measured by three-or four-hour paper-and-pencil standardized or teacher-made tests that ignore the emotional, social, and spiritual dimensions of learning. In this connection, Surya articulated his vision of pedagogy, which is captured in the following narrative.

I have already expressed my discontent with the pedagogical practices in school and university, in which most classroom activities focused on solving bookish questions that were largely disconnected from our sociocultural and historical landscapes. Approximately four decades ago, most textbooks were written by foreign authors whose contexts and content did not align with the real-life scenarios of Nepali learners. Teaching and learning activities were guided and governed by the final examination. The central aim of the teaching is to prepare students for examinations. I found that the mathematical content in school and university curricula has tremendous potential to connect with other disciplines and help solve emerging real-world problems. However, our textbooks, pedagogical practices, and assessment systems do not incorporate such a vision. It restricts our students within a framework of reproducing mathematical knowledge. It confines them to follow the written and unwritten institutional and classroom rules of behavior, which hamper their overall development.

In this context, first of all, we must develop a pedagogical approach that focuses on enhancing student creativity and innovative thinking rather than on a technocratic approach. Secondly, we need to connect mathematical content to real-world problems so students can easily understand what they learn. Thirdly, we have to create a fearless, enjoyable, and learner-friendly learning environment in which students can freely express their voices, listen to and respect other voices, ideas, concepts, and perspectives, and feel joy and pride, recognizing themselves as recognizable and valuable practitioners so that they can be deeply engaged in the learning process. It supports the learners in engaging in novel activities through self-actualization and autonomous scholarship.

In the same fashion, Pawan articulated his narrative. *I am in a dilemma: why is mathematics made so complicated, decontextualized, and tedious? It is very simple and interrelated to other disciplines and real-life problems. The major problems are: mathematics curricula that seek an instrumental understanding of the subject matter; pedagogical approaches that focus on lockstep algorithms; and externally administered assessment systems in which students were, and still are, compelled to reproduce mathematical knowledge. We can easily bring about significant change in ME by creating a learning environment that attracts and energizes our students to engage in learning. In so doing, we must first connect mathematics to daily activities. I repeatedly make such claims because our students cannot find the area of their land,*

cannot determine the number of bricks needed for the house, and have no idea how to calculate the volume of the wooden timber, even though all of these concepts were and still are taught in school. Secondly, we need to reverse a perpetuating negative narrative about mathematics—mathematics as difficult, abstract, dispassionate, masculine, to name but a few —to create a positive, encouraging narrative of mathematics—mathematics as a simple, applicable, enjoyable, social, and human-created discipline that helps solve real-world problems. Thirdly, we need to consider the emotional factors of learning during teaching-learning activities that might help develop positive relationships between teachers and students, and students and parents, so that students engage deeply in learning. As a senior mathematics teacher and trainer of the Educational Training Centers (ETC), a government agency for providing training to school-level teachers, I have found that mathematics pedagogy seems to create fear and pressure among the practitioners because of the overburden of content, transmissionist pedagogy, and undue pressure on achieving outstanding marks (grades) in the examination. We are unsuccessful in creating a learning environment where students can freely engage in learning.

Likewise, Durga outlined her views as follows. *From the beginning of my journey in ME, I have felt alienated in mathematics classrooms because of the lack of recognition of our mother tongue, community practices, number names, and ancestors' historical practices. I have realized that mathematics has become a tool for seeking knowledge solely for its own sake. The unidimensional nature of instrumental economic rationality, which promotes mechanical, purely mathematical knowledge and concepts that have occupied central roles in our curriculum, textbooks, and teaching-learning activities, restrains the development of human beings' empathetic values and interconnectedness with other humans and nature. I do not mean that mathematics lacks the power to address real-world problems, but the major problem lies in our curriculum, pedagogy, and assessment practices, which foster a disengaged learning culture and restrict our activities to preparation for examinations. Engagement in learning mathematics entails social, cognitive, emotional, spiritual, cultural, ethical, political, and ecological dimensions, so that learners become aware of interdependence and coexistence among phenomena and can work as change agents to bring transformative changes.*

From the above narratives, it is not difficult to understand the implemented pedagogical practices in our context. It has been constrained by curriculum and

assessment, which seem resistant to change due to entrenched, centralized, and bureaucratic structures focused on imparting a body of mathematical knowledge and sanctioned by standardized testing, which decelerate the adoption of an engaged and empowering pedagogy (Cuban, 2013; Fullan, 2015).

In traditional Western-Eurocentric learning spheres, learners are treated as non-epistemic, non-agentic objects, ready to be manipulated and shaped by external experts (Santos, 2016). Their identities are assigned by others in institutional settings where learners are confined to the classroom. In contrast, learner identity is created by active participation as an epistemic and agentic being. It is not static and dogmatic, imposed by someone else, but a continuous process of formation, deformation, and reformation through a dialectical interaction between learners and their sociocultural, historical, and political context (Luitel & Taylor, 2010). It means that it is constructed through the learning process; however, we cannot deny the power dynamic in society and educational institutions (Gutiérrez, 2013). In this context, engaged pedagogy needs to make learners aware of their identity, which might have been distorted by the combined effects of globalization and marketization/ privatization of education under neoliberal political-economic policy.

In so doing, schools and universities provide systemic exposure to selected aspects of the dominant culture in a way that eschews social conflict, social and epistemic injustices, and institutional violence (Giroux, 2011), as if all of these were natural outcomes beyond institutional control. It promotes the narrow view of education as schooling that aims to develop an individual with technical and instrumental knowledge, skills, and character to live good lives by adopting within the existing society. It is for the fulfillment of their livelihood rather than focusing on the goodness of humankind and community (Kemmis, 2008). It is such a type of engagement of learners in a learning process that revolves around the integration of the cognitive, affective, and behavioral components, which have been narrowly presented as reproducing and remembering capacities, sympathetically related affection, and sanctioned behaviors (Fredricks et al., 2004; Guthrie & Wigfield, 2000). The conception of deep engagement goes beyond these narrowly conceived constructs because it assumes a critical sociocultural context in which students get an opportunity to raise questions about the values and purposes of their learning and are thus willing to take responsibility as agents of their learning (Goodson, 2009; Goodson & Beista, 2010).

Developing agentic aspects of learning involves humanization (Freire, 1993) and emancipatory rationality (Habermas, 1973) that do not restrict learners within the first-order desired and encourage them to actively participate in social and communal activities through which they begin to seek and make meaning of the knowledge and skills. It signifies that learning must be meaningful and purposeful not only for the life of the individual learner but also for society, the nation, and planet Earth. Moreover, deep student engagement in their own learning is the most imperative tool for creating socially just practices that emphasize agentic practices such as making conjectures, discussing, justifying, and even arguing about alternative ways of learning rather than watching their teacher do mathematics. Deeply engaged learning focuses on the 'Teach Less, Learn More' initiative (Yeo et al., 2006) that can persuade a change in the theory of learning as a process of obtaining something predetermined by arbitrary power of institutions (Brown & Thomas, 2009) in which learners can autonomously use their scholarship to make a difference in their lives, society and nation for enriching social and epistemic justice (Fricker, 2007; Paraskeva, 2016; Santos, 2016). It signifies that a deeply engaged learning environment honors learners' ability to generate ideas, tackle open-ended problems, and take charge of their own learning (Darling-Hammond, 2010; Flores, 2007), thereby contributing to socially, ecologically, and epistemically just practices within and outside the schools.

A deeply engaged learning environment promotes epistemic justice by recognizing learners' sociocultural and historical resources as significant contributors to enhancing learning (Fricker, 2016). Recognition of learners' onto-epistemic practices rooted in their ancestors' lived experiences offers the opportunity to learn through action and reflection and to engage in profound collaboration with their senior family members to fulfil their livelihood needs. It also helps connect their experiential learning to the classroom and vice versa, and thus, learners feel that their sociocultural and historical knowledge, skills, and concepts are acknowledged and valued by institutions.

Experiential learning through active participation can develop critical subjectivity (Heron & Reason, 1997) because learners directly encounter learning situations in which they observe, think, reflect, and connect them to the immediate environment, enabling them to make wise decisions. A deeply engaged learning environment allows the learners to share their knowledge and voices without prejudice to their scholarship (Fricker, 2007) and encourages them to participate in knowledge

production (Dotson, 2014). It illuminates that disengaged learning occurs when a pedagogical activity fails to recognize learners' onto-epistemic resources, restricts their access to them, and fails to acknowledge them as cognizing beings (Fricker, 2007, 2016). It is because barriers have already been set to their ways of knowing through the universal, objective, and acontextual nature of mathematics (Solomon & Croft, 2016; Walker, 2020) that isolates the knower from known and thus the learner becomes the doer without reflection (Dewey, 2001) and hence fails to connect learning to their lifeworld.

Another way to create a deeply engaged learning environment, as indicated by my research participants, is to connect mathematical knowledge and skills to real-world problems by breaking the narrowly conceived disciplinary boundaries of egocentrism (Connor et al., 2015). It adversely affects teaching and learning activities because it fails to recognize the connection between a given discipline and interdisciplinary subjects or problems, thereby confining learners to a particular problem. Likewise, it rejects other viewpoints and often fails to recognize differences in perspective; their contributions again foster the isolated visions that have detained practitioners within the discipline's discrete tasks (Connor et al., 2015). In addition, disciplinary egocentrism diminishes students' motivation and readiness to engage in multi/interdisciplinary education. It paralyzes teachers to the point that they are unable or unwilling to engage with emerging alternative approaches in their discipline (Richter & Paretti, 2009).

At this stage of my inquiry, I realized that disciplinary egocentrism is prevalent in modern academia, particularly in ME, and may create a barricade to connecting mathematics with their lifeworlds. Engaged pedagogy helps transform the classroom into an active learning culture where students and teachers engage in lively discussions, sharing their own ideas, knowledge, and skills while simultaneously questioning and critiquing others'. It supports fostering empathetic connections among practitioners.

Empathetic connection can enhance a learning culture within and beyond school premises by fostering deep engagement in day-to-day life with peers, families, society, and professional communities. In this context, many scholars have argued that mathematical learning becomes cold, dry, tiresome, and lifeless (Ernest, 2012; Lamichhane & Belbase, 2017; Luecke, 2025; Luitel, 2013) because of the disconnection of mathematical content and its pedagogy with the time, places, context,

and nature in which the learners grow up. Without connecting the immediate environment, mathematics pedagogy cannot foster an engaged learning culture (Cobb et al., 2009; Ngware et al., 2015). Disengaged pedagogy restricts the learners from bringing their lived experiences into the mathematics classroom (Louie, 2017), thereby failing to connect head, heart, and hand during the learning process (Palmer, 1998; VanDeWeghe, 2009).

Considering the affective dimension in mathematics learning means addressing learners' emotions, so they feel free to participate in learning, share their experiences, and recognize and value their knowledge, skills, and perspectives, thereby becoming enthusiastic learners. Cognitive dimensions of learning allow the learners to expend maximum cognitive capability to analyze, argue, discuss, justify, create, conclude, and forecast. Practical aspects consider learners' ability to use mathematical knowledge, facts, theories, and skills to solve routine and non-routine problems that help bridge the gap between theory and practice.

The spiritual dimension helps connect all three aspects of learning for developing intra/interpersonal relationships, a sense of belongingness to nature and Mother Earth, and valuing all lives of humans and non-human creatures (Gutiérrez, 2022). In this context, Buchanan and Hyde (2008) explained that students might explore the causes of poverty (cognitive); upon reflecting on the issue, they gain more profound awareness of, feel and realize the human suffering caused by poverty (affective) that awareness and realization of human suffering can be a transforming experience for the individual to contemplate (spiritual) and what they can do to contribute to the alleviation of the poverty in the region (practical).

At this stage of my inquiry, I have realized the over-glorification of materialistic advancement of modernistic society, economic rationality, and neoliberal economic policy cast a shadow on ethical values, and empathetical thinking and doing by devaluing worldviews and ways of knowing emanating from the lifeworld practices of the people of GSTR (Santos, 2016) and ignoring interconnectedness and coexistence of human beings and nature that support for perpetuating the conceptions of narrowly conceived aims of lives and education—achieving the materialistic supremacy by controlling, exploiting the resources by means of deploying state apparatus (Giroux, 2020a). Modern education seems unsuccessful in developing and nurturing spiritual thinking, seeing, and doing in youth (Belkin & Tropina, 2015; Carpenter, 2020). It disrupts developing awareness about the present crisis of the

world, disrupts general communicative tolerance and resilience thinking, lessens the capability of realizing the roles of self-actualization and self-evaluation, impedes empathetic thinking and the power of critical reflection, and thus students become uncritical consumers of knowledge (Bazarova, 2019; Gerasimova et al., 2021).

Learners seem unable to see the deep interconnectedness and interdependence among human beings, other living creatures, and the rest of nature due to a lack of a spiritual dimension in schooling and university mathematics. They cannot realize that individual materialistic prosperity and inner peace are not achieved without empathetic connection to others and nature (Chapman et al., 2024). In this connection, Palmer (1998) argued that it is necessary to nurture the minds of modern youth to recognize that inward and invisible forces are at least as important as the material, visible, and empirical world, without which we cannot attain true peace and prosperity in our lives. In this regard, I have realized that if pedagogical practices in ME fail to connect learning with nature, time, place, and other living beings, they perpetuate colonized mindsets among learners (Greenwood, 2013; Tuck & Yang, 2012). It signifies that deep spiritual engagement fosters students' awareness of the disempowering forces in contemporary mathematics and suggests that they be mindful and compassionate in learning through the unification of the head, heart, and hand (VanDeWeghe, 2009).

Becoming mindful means that students need to pay close attention to everything, both internal and external, so they can see the interconnectedness with self, others, and the world, and reflect inwardly and express outwardly in ways that could make a viable change in their thinking and doing (Buchanan & Hyde, 2008). For example, learners could take into account contemplating the issues of human suffering, global crisis, and economic and social inequalities as interwoven threads that are inseparable from one another and orient to resolve these issues for human well-being, coping with the global crisis, narrowing economic and social inequalities, and mitigating climate emergencies rather than focus on the fulfillment of individual greed and materialistic aspirations. It signifies that when students engage spiritually, they feel connected to the inner and outer worlds and begin to see them as part of the universe rather than apart from it. A deep connection to the inner and outer worlds helps enrich the sense of strength and the power to manage and control internal and external events, which are basic to developing autonomy, which is essential for unlocking creativity and innovation (VanDeWeghe, 2009).

From the above discourse, I have understood that developing a deeply engaged learning environment in mathematics classrooms is necessary to provide enough space for learners to engage cognitively, affectively, practically, and spiritually. The unity of such dimensions in learning mathematics helps students deeply engage with contemporary issues, explore their intricacies, internalize them, relate them to their lives, and actively resolve them. From this perspective, engaged pedagogy is not only for enriching the narrowly conceived achievement of students in particular disciplines, but it is a broader space in which learners can be democratically involved in learning by bringing their own scholarship, irrespective of their social, cultural, economic, ethnic, and historical backgrounds. It is a learning culture where students can demonstrate their capabilities by integrating cognitive power, affective passion, and spiritual sensibility, thereby contributing to the development of critical consciousness.

Pedagogy as/for Fostering Critical Consciousness

Traditional pedagogical practice in ME seems to suffer from the transmissionist approach, which often focuses on rote memorization of mathematical facts, formulae, and theorems without contextualizing their relevance (Luitel, 2009; 2018). Most of the time, mathematics pedagogy confines learners within the four walls of the classroom and compels them to be passive recipients of knowledge without interrogating the embedded values and perspectives (Freire, 2005). This model dehumanizes learners by preventing them from participating in mathematical discourse in a realm of lived realities. It renders mathematics indifferent to historical and political astuteness and deliberately neutralizes social issues—including injustices, uneven distribution of resources and economic benefits, asymmetric power dynamics, and many more (Giroux, 2020a). The effects are that students believe social discrimination, economic disparities, and access to educational and other resources are due to luck or divine power that should not be challenged (Freire, 2005). Students have started to blame the victims for their oppressive situation and have argued that they are responsible for it. Such naïve/magical consciousness (Freire, 2005) developed through traditional pedagogy led practitioners to see social, economic, and other inequalities as outcomes of incidents unrelated to educational, social, and political settings (see Chapter V). In such schooling, students are not ready to take action against the pervasive nature of oppression, even though they recognize systemic oppressive structures (Stubbs & Hullinger, 2022). In this regard, I have envisioned a

pedagogy to address the shortcomings of the traditional banking approach by integrating the conception of critical consciousness.

The education system and its aligning pedagogy have been seen as significant drivers of individual emancipation and social empowerment, while simultaneously serving as tools of social control to maintain the oppressive systemic structure (Jemal, 2017) and ideology (Luitel, 2018). The systemic oppressive structure and hegemonic ideology have been maintained and perpetuated through curricular processes, pedagogical practices, and methods of assessing student outcomes. In this regard, I have conceived critical consciousness as a process of raising awareness among the practitioners about entrenched, oppressive systemic structures, the perpetuated injustices, and the hegemonic ideology across different sectors of an institution, society, and nation, and encourage practitioners to act continually to resist oppressive norms and foster an inclusive and just society. In the following verse, I have portrayed my visions of pedagogy, emanating from my lived experience, aiming to nurture critical consciousness.

Pedagogy disrupts the quietness of a classroom on a new day
Where teachers and students dialogue, dance, and play.
Learners begin to interrogate oppressive forces,
To voice for equitable participation in discourse.

Pedagogy breaks boundaries of disciplinarity,
Igniting critical thinking for disrupting neutrality.
Learners call the onto-epistemic cosmos of the context,
Resonating sociocultural, historical, and political vortex.

Pedagogy becomes an illuminative educational vehicle,
Ensuing theory-action-reflection as a learning cycle.
Learners engage in promoting a just society and nation,
Navigating an empowering journey of transformation.

Likewise, Bishnu delineates his opinions in response to my queries about pedagogical practices that may address the issues explored in the previous conversation in chapter V. *I (and possibly other educators) thought the ideal classroom should be quite silent, and obedient learners must follow prescriptive thumb rules and employ algorithms to reproduce mathematical knowledge, facts, and theorems. Mathematical contents were and still are presented as uncontaminated, ultra-rational, and scientific entities having universal and neutral attributes. These*

unspoken and unwritten attributes of ME and its aligning pedagogy isolate the learners from the social, historical, and political milieus that make learners indifferent to social issues. In this connection, we urgently need to dismantle such dehumanized pedagogical practices in ME to foster an empowering and inclusive learning environment.

Mathematical pedagogical practices must connect mathematical activities to social and historical issues rather than rely solely on decontextualized textbook problems. The mathematics classroom has become a place where students can participate in dialogue, irrespective of their background. A dialogical learning environment blurs the boundaries of the teacher as knowledge dispenser and the student as knowledge recipient. It helps students and teachers to recognize and challenge oppressive and dehumanizing political, economic, social, and institutional systems that perpetuate injustices in society. We can teach the basic concepts of sets and their operations by incorporating social and political issues. For example, we can consider land distribution in their villages, as well as male and female executive heads of local institutions—schools, local government, clubs, political parties, consumer advocacy committees, community development committees, and many more. We can raise questions: why do some people have enough land while others do not even have a small piece? Why are there fewer female executive heads in our social and academic institutions? These simple examples help develop learners' awareness and enable them to recognize and challenge oppressive and dehumanizing political, economic, and social systems. I mean that we teach students to raise questions, but not to become mute followers of the system. Through mathematics pedagogy, we must equip them with knowledge, skills, values, and courage to develop a broader socio-political awareness that enables them to critique and challenge oppressive forces and to participate in action that can contribute to creating a socially just society.

From the above narrative, I understand that the prolonged enactment of traditional mathematics pedagogy shapes practitioners' mindsets, leading pedagogical activities to proceed smoothly when learners unquestioningly follow prescriptive thumb rules and algorithms. Being silent and engaging in solving bookish questions are the significant attributes of good learners. It promotes a culture of silence, a tool of oppression that mutes learners and prevents them from creatively engaging in the learning process (Grundy, 1987). It is necessary to break the culture of silence because of its domination and ignorance of learners as subjective beings and sidelines them as

fragile objects that can be easily shaped according to the interests of intellectual elites (Freire, 2005).

The silencing culture further disempowers the learners by spreading misinformation about mathematical objectivity and neutrality, enabling those in power to maintain political, social, and economic advantages (Stephan et al., 2021). In this connection, I have realized that ME should not be restricted to the imparting of knowledge to passive learners. It needs to raise awareness and empower learners so that they can understand entrenched, dominant social, political, and economic structures, enabling them to be ready to take action against oppressive forces (Giroux, 2020b; Hawkins, 2014; Silva & Langhout, 2011; Tunstall, 2011). In so doing, the mathematics curriculum, its pedagogy, and the teacher as implementing agency should create space and opportunity for learners to participate in free and pure dialogue (Habermas, 1972).

A fair and pure dialogue fosters critical thinking and enhances democratic participation in learning through mutual collaboration and cooperation (Habermas, 1972). A mathematics classroom should become an unimpaired and vibrant public dialogue sphere that disrupts the narrowly conceived instrumental rationality pervasive in mathematics pedagogy, and fosters communicative rationality that enriches mutual understanding and consensus on societal issues and systems (Habermas, 1972). It is an ideal speech situation in which people can communicate openly and honestly about imbalances in power structures underpinned by systemic institutional and societal settings (Habermas, 1972). The asymmetric power distribution in society shapes social systems that often colonize the lifeworlds of majority-minoritized people by undermining democratic participation (Abtahi & Planas, 2024; Giroux, 2020a). From this perspective, we should not understand dialogic engagement in isolation; it has enduring effects not only in classrooms but also in broader societal and political arenas.

In the utmost, the Hindu philosophical perspective describes the honest discourse that has taken place between Arjun, a warrior, and lord Krishna, serving as a charioteer of Arjun during the *Mahabharata Yuddha* (the Mahabharat war, the war between the *Kaurav and Pandav*), seems to be a powerful strategy to understand the essences and complexity of phenomena under consideration.

In the succession of the honest discourse, there are no opponents. Two or more individuals or groups participate in the discourse to understand the essences,

meanings, perspectives, and values of social, political, historical, and academic phenomena, aiming to determine individual or group roles to be performed as human duties as their *Dharma*. The honest discourse between Arjun and Krishna occurred when Arjun refused to go to war against his siblings, Gurus, and relatives and decided to renounce weapons. In this situation, there was a lengthy discourse between Arjun and Krishna. Arjun posed questions and expressed his discontent to Krishan, saying that the war would not yield good results; it might result in massive casualties on both sides; we had lost our siblings, relatives, and Gurus, which might have destroyed our lineage. How can I deploy my arms to destroy our lineage? In responding to Arjun's questions and disagreements, Krishna said that it was not an isolated endeavor that you have perceived as violence against your relatives and Gurus. It is a war for justice. It is not a war against any lineage, kinships, or Gurus. It is a righteous battle against gender violence and social injustice. That is, against the violence inflicted upon *Draupadi* in the royal place in the presence of dignitaries of the royal assembly, where an attempt was made to disrobe her. It is a war for justice against those who deceived King Yudhishthira in a gambling match, which led to the *Pandavas*' exile. Likewise, it is a war against the deceitful, authoritarian, and imperialist mindsets of the *Kauravas*, who even refuse to provide a small sector of the kingdom to the *Pandavas* for their livelihoods. You must not forget that most of these evil actions stem from Duryodhana's planning and directives, and from *Dhritar*ashtra's intense longing for his son. It is a *Dharmic* war.

Engaging in a righteous war to restore the *Dharma* and the path of righteousness is the duty and responsibility of the *Kshatriya* lineage. To escape from it is a great transgression. In this context, you are obliged to defeat unrighteousness and become a proclaimer of truthfulness and *Dharmic Karma*, thereby preserving the sanctity of the *Kshatriya* duty. These *Karmas* (actions) can only justify your mastery of archery and bravery, which hold significance in this situation. Arjun again argued that how can it become *Dharmic Karma* to wage war against siblings, relatives, and Gurus to obtain the territory of our state? In my opinion, it again shows our desire for materialistic living. Is it not admirable to message people that the *Pandavas* have abandoned their kingdom and are going into exile to pursue righteousness and preserve peace in their own country? Indeed, Krishan replied that it is one of the logics that only explains the face values of the context. There are so many other aspects as well. If you forsake this war, it will serve to embolden the unrighteous actions of

demonic characters. Their morale will be bolstered, and they will be motivated to commit malevolent acts that might precipitate a significant crisis. It won't be easy to track the righteous acts. It does not depend solely on your decisions, because it is a matter of the *Dharmic Karma* of the *Kshatriya* lineage. More precisely, actively engaged in the redemption of those involved in immoral and nefarious activities is also a *Dharmic* duty, Arjun. I am also involved in this war to protect *Dharma*, serving as your charioteer. Then lord Krishna chanted the famous verses, with the conch sounds, found in chapter four, verses seven and eight of the Bhagavat Geeta, which are as follows:

यदा यदा हि धर्मस्य ग्लानिर्भवति भारत ।
अभ्युत्थानमधर्मस्य तदात्मानं सृजाम्यहम् ॥४–७॥
परित्राणाम साधूनां विनाशाय च दुष्कृताम् ।
धर्मसंस्थापनार्थाय सम्भवामि युगे युगे ॥४–८॥

(Yada Yada Hi Dharmasya, Glanir Bhavati Bharata,
Abhyutthanam Adharmasya, Tadatmanam Srijamy Aham.
Paritranaya Sadhunam Vinashaya Cha Dushkritam
Dharmasthapanarthaya Sambhavami Yuge Yuge).

Literally, it means that whenever there is a decline in righteousness and an increase in unrighteousness, at that time, I manifest myself on earth. And to protect the virtuous, to annihilate the wicked, and to re-establish the doctrine of righteousness, I manifest myself in every age. Such provocative and deliberative dialogue served as a profound source of motivation for Arjun, encouraging him to engage in the Dharmic war to re-establish a righteous path and the longevity of peace in his motherland and the world.

At this point, I have come to understand that dialogue should not be oriented toward defeating one another; rather, it should focus on exploring the multifaceted aspects of the phenomena under discussion. Arguments in the dialogue must complement one another to make contextual meaning and its multidimensional educational, societal, and political impacts. Likewise, this dialogue also suggests that if we are not able to connect the mathematical tasks with social, cultural, and political context, then they almost become meaningless, if not all, because it should not foster the grounds for the practitioners to see the world from a wider perspective and restrict the students within the narrowly conceived mathematical tasks, as for the academic discourse.

Reflecting on my school-level mathematics, I found that we (as learners) were constrained to textbook problems, which remain highly decontextualized, even though the mathematical content has the potential to enrich critical and creative thinking. For example, there was a chapter on simple and compound interests. I was taught to find simple and compound interest by using the formulae (See chapter V, p. 145). There were and still are rare examples or exercises dealing with the appropriateness of interest rates. Who endorses the compound interests? At what rate of interest is it ethical? I have not found any discussion about these questions. Students are compelled to find solutions to abstract mathematical problems characterized by neutrality, apolitical, and formal that reside in different mathematical worlds apart from the human world (Ernest, 1991; Walkerdine, 1990). Likewise, students are discouraged from developing critical and innovative thinking and from engaging in actions that utilize multiple perspectives, ways of doing, and problem-solving approaches, resulting in disconnected, isolated, and decontextualized learning (Boaler & Greeno, 2000; Gutiérrez, 2012). It signifies that mathematics pedagogy must connect social, cultural, historical, and political issues to develop practitioners' awareness, enabling them to see events and phenomena from multiple perspectives and explore their future impacts; otherwise, they remain indifferent to these issues (Gutstein, 2009).

A pedagogical activity that provides an opportunity for students to engage in social and political issues helps develop a critical consciousness because they can observe, explore, and recognize the social, political, and historical reality embedded in ME (Skovsmose, 2007), and then are willing to act to bring positive change in society. In this context, I want to share one experience. I became an eyewitness to one of the regrettable events at the beginning of the second decade of the 21st century. It was the time when I had just started writing the chapters of my PhD thesis. I saw an offensive demonstration rally in the capital city of Nepal, Kathmandu, organized by victims of Meter byaji (people who are victimized by exorbitant loan interest rates) (see Figure 12). They came from different rural parts of the country, and most of them, if not all, were barefoot. They have organized this rally because high interest rates, sometimes reaching 36—120% per annum, can lead them into a never-ending cycle of debt and loss of ownership of their land and houses (https://nepalilaw.com/meter-byaj-offense-in-nepal-understanding-the-implications-and-the-path-to-economic-stability/).

The landlord, capitalist, and small-bourgeoisie imposed exorbitant, exploitative interest rates on loans to their neighbours and the poor through the exercise of power

and privilege. They had knocked on the gate of the Singh Durbar (a central administrative office of the Government of Nepal) to appeal to the prime minister to hear their problems and take immediate action to eradicate such a system. In my opinion, it is nothing but the effect of the neoliberal hubris and fatalism that we are witnessing at the end of the twentieth century, informed by the ethic of the market, an ethic in which a minority of elite groups or individuals make most profit against the lives of the majority of the people (Freire, 2005). It is a kind of violence.

Violence is always initiated by those who are in power, who oppress, who exploit, and who fail to recognize others as human, but not by those who are oppressed, exploited, and unrecognized. However, the minority group of people who are in power and have been privileged by the state blame the oppressed people as the instigators of the violence when they challenge their status quo and domination (Freire, 2005; Valero, 2023). In this situation, I have some pressing questions: do the intrinsic human virtues—moral values, ethical principles, compassion, cooperation, and integrity—irrevocably diminish in the 21st century? Do our educational institutions fail to nurture these values?

At this inquiry stage, I have realized that mathematics pedagogy should develop critical consciousness to help learners overcome false consciousness (Freire, 2005). The state of false consciousness in ME can be understood as a narrowly conceived framework that promotes the universality, neutrality, and objectivity of mathematical knowledge and ways of knowing, while ignoring other practices emanating from the non-Western world and isolating ME from social-cultural, historical, and political settings (Martinez & Yeong, 2019). The neutral and objective orientation of mathematics pedagogy instills in practitioners the belief that social, political, and economic phenomena are the product of chance beyond our control (Apple, 2019). Such a conception rests on the Newtonian realist worldview, deeply etched into the public consciousness, leading practitioners to participate in their own domination by uncritically accepting the existing oppressive system (Stephan et al., 2021). It further implicitly underpins and perpetuates oppressive systemic social, institutional, and political structures. In this regard, pedagogy needs to foster critical consciousness to help learners understand themselves, others, the environment, the world, and their place (Shin et al., 2016).

In this context, I have tried to illustrate how pervasively adopted technical and instrumental rationality in mathematical pedagogy indirectly evokes or consents to the

suppression of systemic structural injustices that do nothing but create an environment in which learners are led to think that solving bookish questions by deploying a given set of algorithms is enough in mathematics. Deploying a set of algorithms to solve pre-designed tasks merely replicates mathematical facts, and knowledge is the enemy of creativity, potentially diminishing learners' critical thinking and leading them to accept the status quo (Harris & Jones, 2022).

As an insider of Nepali ME practices, I have found that mathematics pedagogy is rarely connected to real-world problems. Sometimes, teachers bring a few examples from real-world issues; however, these issues focus on enriching conceptual understanding of mathematical knowledge rather than relational and socio-critical understanding. I still remember that our teacher brought examples of an empty set—a set of women prime ministers of Nepal (at that period there was not a women prime minister of Nepal), a set of women campus chiefs on our campus, and a set of women mathematics teachers on our campus (I got an opportunity to learn set theory at proficiency certificate level, which is the first degree of university level at that time). These examples capture the essence of the empty set by relating to real-world problems; however, there is little discussion of why these events have occurred in our society and institutions. Why can't a woman be elected as Nepal's prime minister? Why is there no female campus chief on our campus? Why is there not a female mathematics teacher on our campus? Is a female incapable of these posts? Are there any systemic societal, political, and economic structures that prevent women from attaining these positions? There is a high likelihood of exploring issues of gender inclusiveness in the political and academic arenas; however, mathematics pedagogy does not orient to create a discourse that provides ample opportunity to discuss the possible forces at play.

In this context, Giroux (2011) argued that textbooks provide a systematic exposure to selected aspects of the dominant culture. She further explained that school serves as a dominant institution in which subject matter is presented in a way that eschews social injustices and power dynamics within society and institutions. Unfortunately, mathematics teaching and learning activities rarely incorporate the above-mentioned attributes that insidiously promote magic/naïve consciousness, leaving the younger generation an aloof spectator of the phenomenon (Lamichhane & Luitel, 2023a; Leyva, 2017; Stinson, 2013; Warburton, 2015). At this stage, I have realized that mathematics pedagogy should create a learning space in which learners

have the opportunity to engage in dialogue and become continuously critical reflective practitioners (Schön, 2017) to foster critical consciousness.

Critically reflective practitioners challenge underlying assumptions and question existing practices of social injustice and dominance, thereby continuously exploring new lenses to view not only pedagogical practices but also their social, cultural, and political entanglement, and are willing to alter their perspectives (Larrivee, 2000; Mezirow, 2012). The critical reflective practices enable students to re-examine their past experiences and explore the intrinsic forces embodied in ME. It supports the creation of a room for the learners so that they can engage to improve their present actions by incorporating real-world problems that further help infuse their practices with a vision and purpose as they continually forge new grounds where they learn from the past and present and thrive in the future (Schön, 2017). Such practices enhance understanding of the interconnectedness and interdependence of mathematics pedagogical practices with social, political, and cultural settings.

Likewise, critical reflective practitioners do not merely critique and challenge other assumptions, values, and practices; they also deeply consider their own assumptions, beliefs, and values, embodied in their thinking and actions (Brookfield, 2017). In this context, I have argued that mathematics pedagogy should strengthen and empower learners so that they become conscious citizens and can critique, challenge, and disrupt the dominant structure and hegemony perpetuated by the myth of abstraction, generalization, and the universality of mathematical knowledge (Mukhopadhyay & Greer, 2001; Skovsmose & Valero, 2001). The pedagogical practices only focus on abstraction and generalization of pure mathematical contents without relating to social, cultural, and political milieus, seem to learn to swim in a library (Gutstein, 2018) because such pedagogical activities cast shadows on community issues and struggles, and restrain learners as the passive spectators of injustices and inequalities in institutions and society, so that they could obey the systemic oppressive structures. It further perpetuates fatalistic and serendipitous attitudes among practitioners, which erode creative, innovative, and critical thinking and actions, and support the precipitation of socially unjust practices.

In this regard, mathematics pedagogy has to focus on what is taking place today in various social, cultural, and political moments and labor markets, aiming to explore the hidden forces and to invite learners to actively participate in disrupting different forms of inequality and fostering the possibility of socially just practices. It is

all about uncovering and locating present, existential, and concrete situations that I have described above from which to begin the pedagogical process that would simultaneously support students' learning by connecting local to global contexts and enhance a deeper understanding of reality from a more critical and multifaceted perspective (Geiger et al., 2025) so that they would be critical citizens and will be engaging in creating an equitable society where every individual not only thrive to achieve their highest materialistic endevour but also have a profound understanding of the intricate interdependence and coexistence of human beings, non-human creatures, and natural world.

Pedagogy as/for Nurturing Planetary Well-Being

At this point in my inquiry, I have come to understand that the project of modernity, which is entangled with colonial and imperial thinking, places Western-Eurocentric thought in a superior position and subordinates all other forms of knowing and doing (Valero, 2023). It has not only hegemonized and controlled the mental universe (Thiong'O, 1986) of the people from GSTR, and instigated systemic oppressive structure through education, techno-cultural tools, and financial aids (van Stam, 2017), but also exploited natural resources for the benefit of humans, particularly 'western humans' (Valero, 2023), creating threats to planetary well-being. I have realized that it is not sufficient to explore and disrupt domination and hegemony to 'other people'; it is also necessary to unearth the footprint of the past 200 years of modernity project, a hidden and brutal form of colonialism (Andreotti, 2015; van Stam, 2017) that cause irreparable destruction of biocultural diversity, climate change, and planetary well-being (Roulston, 2022).

In this subsection, I used the concept of planetary well-being as an umbrella term that advocates more-than-human perspectives that manifest as dialogical relations between humans and the rest of nature. It is a state in which the integrity of the human realm, ecosystem, and earth systems remains unimpaired to the degree that all living and non-living things on the planetary earth can persist well into the future. It extends beyond unipolar thought, such as anthropocentric and ecocentric views, to create a rational balance among different perspectives for the well-being of all living creatures and the rest of the natural world. It advocates maintaining a rational balance among the diverse systems of Mother Earth for the sustainable coexistence of human beings and the rest of nature (Abram, 1996). By denying the artificial categories of humans, nature and culture, Haraway (2004) highlighted inseparability that, "there is no border

where evolution ends, and history begins, where genes stop, and environments take up, where culture rules and nature submits" (p. 2) which need to be incorporated in pedagogical practices to make aware the learners regarding the unimpaired dialectical and dialogical relations between the human beings and the rest of the natural world.

From a pedagogical perspective, planetary well-being refers to strategies for teaching and learning that enable learners to explore the interconnectedness of all life on earth and the rest of the natural world, and encourage them to become responsible citizens. Pedagogical activities focus on illuminating the importance of preserving a livable planet for the future by nurturing empathetic views and relational and critical understanding of the phenomena (Aaltonen et al., 2024). In this regard, I have a prominent question: how can ME and its pedagogy contribute to exploring the bidirectional relationships between human beings, other living creatures, and the rest of the natural world?

In my experience, modern education and its pedagogy focus on enriching specific knowledge and skills that align with economic productivity and industrial demands, which appears to be inadequate for securing planetary well-being (Eskelinen et al., 2024). It is because the major intention of modern education, if not all, is to reproduce the current neoliberal political economy that unduly produces unequal economic systems and drastically prompts consumerism and marketization—everything is determined and controlled by the market and tries to justify the inequality and systematic oppressive systems that give rise to the global crises (Ruuska, 2017). The project of modernity that has allowed 'Western humans' (Valero, 2023) to tame, control, and exploit nature for individual benefits poses pressure on the natural resources, the earth's ecosystem, environment, and many more that have worn out human and non-human existence, and pushes the living world to the verge of destruction (Valero, 2023). In this regard, ME and its pedagogy, which desires and continues the modernity project, is nothing more than a death sentence for human beings and all forms of existence on the planet (Valero, 2023). The key function of ME in modern-state-regulated times is to promote mathematical subjectivation by instigating apolitical, ahistorical, and acultural views (Valero, 2023). It indicates that our planet is heading toward multiple crises that are more devastating than the sum of separate cries; however, ME has seemed to fail to explore intricacies between humans and rest of the world and thus become unsuccessful to radically transform the way

most people view our connection with rest of the world that can enable them to drastically alter their actions needed to save the planet (Misiaszek, 2020).

Most importantly, the false-normalized neoliberal framing of economic development and prosperity often casts a shadow over the threats posed by global crises, leading people to take the issues superficially, which is nothing more than appeasement to avoid nature-culture conflict and often fails to secure sustainable solutions. For example, developed countries emit massive amounts of carbon through fossil fuels, various industries, and nuclear power plants, which pose significant threats to the planet. However, they have tried to normalize it through the carbon business provision. They provide little funding to developing and underdeveloped countries to meet carbon-emission standards. It is one of the false normalizations created by the neoliberal framing of progress (development) that rarely mitigates global crises. Does it help to reduce carbon emissions? Can it resolve the current global environmental crisis by providing financial support to developing and underdeveloped countries? Does it lessen global warming, air pollution, and the melting glaciers and the Himalayas? Is the issue of planetary well-being less significant than the physical development of nations? A normative framing of neoliberalism often engulfs what is essential for planetary well-being and, concurrently, urges, through modern education in general and ME in particular, acceptance of the neoliberal framing of development, even though it is not actual development/progress (Kahn, 2010).

Figure 25

Imaginative Depletion of Natural Resources

At this juncture, I have realized that, entrapped within the false normalization of the neoliberal regime, the political and administrative leadership of developing and underdeveloped countries are ready to allow the developed countries to commodify and exploit natural resources, motivated by the elusive promise of economic progress. It is nothing but the stage of hegemony (Gramsci, 1971) in which they (political and administrative leaders) are engrossed in ephemeral gratification while undermining the

long-term sustainable development and planetary integrity. In this connection, I have expressed my views on how mathematics pedagogy is in the following verse.

Rivers reek, having not a drop of fresh water to clean themselves
Hills scream, becoming too weak to stand from within.
The Himalayas are burned by the fury of fire, becoming charred,
Streams and ponds are writhing on their deathbeds,
Yet, mathematics pedagogy becomes an aloof spectator.

Lakes are ravaged by conflagration of water
Plan terrains are asphyxiating, bereft of oxygen.
Skies drown in the smoky ocean, losing their azure,
Forests bear irreparable losses, heading towards desertification,
Yet, mathematics pedagogy holds an apathetic gaze.

Oceans are shrunk by pressing of plastic mountains
Marine life climbs black cliffs for life's quest.
Glacier glides down darkening hills, despairing forth,
Wetlands trembling their hands depart from the earth,
Yet, mathematics pedagogy drifts in quiet.

Distracting the animate world, life, and nature's grace,
Affirming inequality, discord, and oppression's base,
Rejoicing in the singular tune of economic growth.
Masking violence and terror as nature's inevitable causes,
Breeds the creed of colonialism and techno-cultural imperialism,
Yet, mathematics pedagogy rests in deep slumber.

After hearing my research participants' dissatisfaction with the existing disempowering and decontextualized pedagogical practices in mathematics (See Chapter V), I became highly enthusiastic to hear their visions for an alternative pedagogy in ME that could address the inadequacy mentioned above.

Responding to my enthusiasm, Chandra *has argued that a paradigm shift in ME pedagogical practices is necessary to prepare future teacher educators to tackle disastrous planetary crises. Here, we must be aware that pedagogical practices alone might not be enough to address the present catastrophic crises; however, they would contribute to awakening mathematics educators so that they can also raise awareness among their students about the world's present crises. It is one of the easiest, cheapest, and most effective ways of developing public awareness because the knowledge, skills,*

and conceptions gained by students can be easily disseminated to a large portion of the population. Raising awareness is a foremost element to change deeply rooted beliefs, convictions, and attitudes of the students and general public that have been nourished through the prolonged engagement with modern mathematics and neoliberal economic and political systems, where everything is commodified and sold in the market to fulfil the greed of a very few minorities of the elite.

In this context, mathematics pedagogy should uncover the reality concealed by the creation of false narratives of development and progress. It demands pedagogical practices that prevent conventional pedagogy, which merely accustoms students to deploy prespecified algorithms to solve decontextualized bookish problems, and instead offers students diverse ways to engage in learning that can foster a deeper understanding and critical awareness. As per your query (indicating me), of specific pedagogy to address the issues that have been indicated by me and possibly other participants as well. To my best knowledge, no royal and prespecified pedagogy has yet been developed that can be deployed across different contexts, times, and geophysical landscapes.

However, there are some features we can bring into our pedagogical practices that could develop students' awareness. The significant attributes of such pedagogical approaches are to equip students with the arts of questioning, collaborating, communicating, and inquiring, as well as fostering an empathetic attitude towards all humans, living creatures, non-living objects, and the constituent elements of nature. If we incorporate these attributes into mathematics pedagogy, it could be an excellent starting point for a departure from the existing disempowering, decontextualized approach toward more empowering and contextualized approaches. Whatever name you assign, it does not matter as long as it unearths the intricacies of human beings and the rest of the world. In this regard, I believe that 21st-century mathematics pedagogy should not merely focus on enabling students to perform routine tasks. It must turn its focus on developing conscious citizens capable of exploring and addressing uncertainties, both those apparent in the present and those that may arise in the future.

In responding to my query on the same issue, Bishnu has asserted that *our pedagogical practices in ME become isolated and focus on reproducing the mathematical knowledge. As we have already discussed, the existing pedagogical practices seem to fail to foster critical and imaginative thinking, problem-solving*

skills, and higher-order reasoning. These pedagogical practices have adversely affected students and teachers, leading them to believe that doing and learning mathematics mean solving textbook questions. In this context, I want to share that we need to adopt a thematic approach to curriculum design rather than a disciplinary one, which often confines our students and teachers to reproducing mathematical knowledge. Its aligning pedagogy should focus on developing a conceptual, relational, critical, and ethical understanding of the themes, so that learners become aware not only of the socio-political, economic, and historical context but also of the world's present crises. These issues need to be urgently addressed because they not only threaten human life but also undermine planetary well-being. A disciplinary conceptual understanding of the subject matters is necessary but not sufficient to resolve the present global crises, which have multiple interconnected facets and intricacies. In this connection, relational understanding, not necessarily in the form of a functional relation (mathematically expressed formula), is essential so that learners can easily see the connection between human beings and the non-human world. For example, the depletion of water resources in the urban area causes scarcity of drinking water; unbalanced urbanization poses threats to the lives of holy rivers like Bagmati and Bishnumati, ponds, streams and Dhunge Dhara (stone water spouts), uncontrolled uses of fossil fuel cause air pollution and global warming, deforestation causes the loss of habitat and many more, which concurrently poses the threats to human beings as well as the planetary earth.

Last but not least, ethical understanding poses questions for every individual within the broader world about their roles and responsibilities, their behaviours, and their perspectives on the preservation of nature and human beings. It also urges us, as major constituent players on Earth, to alter our actions in favour of the sustainable life of Mother Earth. These are some of the features that need to be incorporated into mathematics pedagogy, not only to make our teachers and students aware of the endemic global crises but also to encourage them to play the roles of agentic actors in the sustainability of the planetary system, ensuring the lives of human beings and the non-human world.

In a similar vein, Durga has articulated her vision of mathematics pedagogy. *We have already discussed the shortcomings of mathematics pedagogy, which is basically entangled with the instrumental approach. The instrumental pedagogical approach to teaching mathematics isolates learners from real-world problems and*

thus inhibits broader understanding of contemporary issues such as gender discrimination, climate change, global warming, and socially unjust practices. Moreover, it solely orients teachers to impart an instrumental approach to solving bookish questions, theoretical concepts, and methods for proving abstract theorems, thereby preventing students from engaging deeply in exploring how mathematics is intricately woven into broader aspects of society and nature. The consequence is that students become disengaged and indifferent toward real-world problems.

To pave the way for resolving the above issues, we need to acknowledge our surrounding environment and natural entities—the Himalayas, rivers, streams, ponds, hills, rocks, forests, etc.—as significant contributors to human life. We do not treat them as objects of manipulation for short-term benefit. When I have deeply engaged in the surrounding nature, I have found that human actions are highly irresponsible for climate change and environmental degradation. In my academic and professional journey, I have rarely seen a discussion regarding these issues on mathematics classroom and thus I (probably other students and teachers as well) remain ignorant of the present crises of the world in general and losses of water resources, the disappearance of streams and pounds, melting of Himalayas, bursting of glacier lacks, the dying of rivers, deforestation and loss of habitats, in the context of Nepal. Nowadays, when I critically reflect on our ME, I have some questions. Why does ME rarely incorporate these issues into our mathematics curriculum and pedagogical practices from the very beginning of formal school to university education? Whose interests play significant roles in designing curriculum, pedagogy, and the assignment system? Now, I have become somewhat aware of the issues, but I (and, most likely, other practitioners as well) could not bring them into my classroom because I am already bound by a curriculum and assessment system. It is one of the most regrettable issues in the academic and professional journey, in which most activities focus on preparing for upcoming examinations. It is because our system evaluates teachers and schools solely on the marks (grades) achieved by our students in district, regional, and national-level examinations, which are externally designed and administered. In this scenario, teachers are obliged to the system and perform accordingly. I have just specified that if we have started to bring our surrounding environment and nature into mathematics classrooms through an interdisciplinary or thematic curriculum that recognizes the interconnectedness of human beings and the rest of the world, for a sustainable future. Pedagogy should foster critical self-awareness so that learners can

question their ethical roles in the sustainability of the planet. Likewise, it helps explore the interdependence of human beings with the rest of the world and raises awareness of their ethical behavioural, and responsibilities. More precisely, pedagogical activities should enable learners to engage in dialogue with ever-changing natural phenomena, acknowledging and internalizing their significance across different spheres of human life, and encourage them to become ethical citizens. What I convey here is that we enable students to be ethical and conscious citizens so that they can contribute to creating planetary justice.

From the above narratives, I have come to realize that the existing pedagogical practices of the Nepali mathematical education landscape need to be transformed. But there are some dilemmas among the participants about which signature pedagogy would address most, if not all, of the issues they raised. However, all of my research participants agree that we live in precarious and challenging times characterized by planetary crises—global warming, loss of biocultural diversity, melting of glaciers, depletion of freshwater resources, losses of habitat, deforestation, and many more, which were endorsed by the footprints of more than 200 years of anthropocentrism (Taylor & Taylor, 2019).

I have captured two types of problems. The first one is the suppression, subordination, and subjugation of the GSTR people, epitomized by neoliberal political economy and modern education and its pedagogy. The second problem is the objectification and commodification of the natural world to achieve economic growth and development, by situating human beings as superior and separate from nature (Eskelinen et al., 2024), thereby deeming everything on the planet. It is not difficult for me to understand, from the lived experiences of my research participants, that most, if not all, of the problems of our times are induced by the education system and political-economic policies rooted in anthropocentric thinking and action (Aaltonen et al., 2024). It promotes monolithic traditions not only in STEM disciplines but also in the social sciences, which support placing human beings in superior positions and regarding them as conscious subjects, while regarding the rest of the world as an object of human manipulation. It further supports the idea that humans can freely use their rational thinking and reason for their own advantage (Horkheimer & Adorno, 2016).

Over time, materialistic rejoicing drives educational institutions and nations to formulate educational policies, curricula, and pedagogical approaches that unduly

support economic growth. It further allows human beings to be consumer of natural resources for their benefits. Taking an anthropocentric view of economic growth as a significant indicator of nations' and individual learners' academic success, it is challenging to align with planetary well-being, as it has been achieved only through the overconsumption of natural resources, which creates pressures and threats to the natural environment (Kortetmäki et al., 2021). Human-induced destruction pushes the planet toward an ecological catastrophe, making it uninhabitable not only for human beings and other living creatures but also posing significant challenges to the planet's sustainability (Griffiths & Murray, 2017).

Planetary well-being departs from the fundamental understanding of the educational goals of economic development, which is underpinned by instrumental thinking and reasoning. Planetary well-being embeds the recognition of natural entities to heighten the well-being of humans, non-human creatures, and the rest of nature. It offers a more holistic approach that emphasizes humanity and the rest of the world equally to prevent the destruction of the earth and to avert the abuse of economic and political power over the natural world (Irving, 2019). It also explores and highlights the integrity of the planetary systems that are vital to the well-being of all living and non-living beings, and Earth systems. Planetary well-being encompasses an ethically inclusive notion of well-being that accounts for the bidirectional relationships and interactions among the diverse entities of the planetary world (Raippalinna et al., 2024). That is, a notion of planetary well-being can be enhanced by recognizing the different forms of diversity on planet Earth, including human cultures and languages. These diversities have dialogical relationships that do not exist in separate and parallel realms. They have developed over time through the mutual adaptation between humans and non-human worlds (Pretty et al., 2009).

Here, we can raise the question of why such a significant factor has not been considered in education in general and ME in particular. It is because of the growth and profit orientations of neoliberal political-economic policy that shifts in consumption patterns, the commercialization of natural resources, and the globalization of markets, in which everything is controlled by the market, thereby paving the way for the exploitation of natural resources (Klein, 2015). It signifies that planetarity challenges Western-Eurocentric boundaries and hierarchies that view the world from an exterior observational point and decisively categorize nature and human beings as independent (Barad, 2003).

In so doing, we need to create pedagogical spaces in mathematics classrooms in which students learn to engage deeply in present crises of the world that inspire, persuade, and encourage them to pay attention to rethink their perspectives and actions within the world in such a way that supports establishing the inseparable nexus between human beings and the non-human world (Griffiths & Murray, 2017). It supports dismantling a pithy economic standpoint as educational goals that implicitly conceal the hegemonic system of power and oppression, which materializes in both the domination of Western people over GSTR people and the domination of human beings over the natural world (Roulston, 2022).

Embracing a harmonious nature-culture relation in academia helps students understand the adverse effects of anthropocentrism inherent in neoliberal capitalism and neocolonialism on planetary well-being (Karkulehto & Koistinen, 2022), and incorporates an interdisciplinary approach, as indicated by my research participants. In so doing, teachers need to bring the issues of the present global crises, arising from anthropocentric thought and action, into mathematics classrooms rather than presenting pure mathematical ideas through imaginary data (data unrelated to real-world problems).

Teachers can use the following data (Table 1) to enrich understanding of human encroachment, exploration, and control of the natural world, including other human beings, that causes irreparable damage to planetary well-being. It helps students comprehend the anthropogenic causes of the emission of large amounts of carbon dioxide equivalents (CO2-eq), a significant contributor to climate change and global warming.

Table 1

Carbon Dioxide Equivalents (CO_2-eq) Emission by Country, Region, and World

Year	Nepal	India	China	USA	EU	Russia	World
2000	45.45mt*	2.02 bt**	5.31bt	7.07bt	7.61bt	1.89 bt	40.73 bt
2005	45.07 mt	2.24 bt	7.67 bt	7.09 bt	7.82 bt	1.96 bt	44.99 bt
2010	47.43 mt	2.87 bt	10.57 bt	6.56 bt	7.85 bt	2.44 bt	49.80 bt
2015	49.55 mt	3.33 bt	11.93 bt	6.52 bt	7.4 bt	2.48 bt	55.44 bt
2020	60.21 mt	3.52 bt	12.84 bt	5.65 bt	6.69 bt	2.40bt	50.79 bt
2023	61.14 mt	4.20 bt	13.97 bt	5.89 bt	6.73 bt	2.69 bt	53.83 bt

*mt = million-ton, ** bt = billion-ton Ourworldindata (2025)

Moreover, teachers can design a project to calculate per-capita CO2-eq emissions and explore their effects on human beings and the rest of the natural world. To raise awareness of planetary well-being, teachers further assist students to examine the causes of producing and ways of lessening the emission of greenhouse gases, especially CO_2-eq, to limit the global temperature to less than $2^{\circ}c$. It offers an opportunity for students to deeply engage in real-world problems to explore the major anthropogenic activities—use of fossil fuels, infrastructural and transportational development, installation of nuclear plants, deforestation, and alteration of land use practices, and many more that cause to emit a massive amount of greenhouse gases, increasing the concentration level of CO_2, CH_4, N_2O, SF_6 in the Earth's atmosphere.

The concentration of CO_2 has increased from an average of 336.56 ppm (parts per million) to 426.03 ppm, a 26.6% increase during the last 46 years. A concentration of Methane (CH_4) between 1983 and 2024 has increased from an average of 1626 ppb (parts per billion) to 1938 ppb, an approximately 20% increase over the past 41 years. Similarly, Nitrous Oxide (N_2O) and Sulfur Hexafluoride (SF_6) have increased by approximately 7% and 193%, respectively, over the last 23 and 27 years (https://database.eart/atmospher/carbon-dioxide, retrieved on January 20, 2025). The increase in CO2-eq gases in the Earth's atmosphere causes global warming. Table 2 shows the trend in the intensification of average annual temperatures worldwide.

Table 2

World Annual Temperature Anomalies Relative to the Pre-industrial Period

Year	Temperature **in °C**	Year	Temperature **in °C**
1950	0.14	2005	0.97
1960	0.25	2010	1.04
1970	0.28	2015	1.19
1980	0.56	2020	1.25
1990	0.72	2024	1.54
2000	0.69	2025	1.63

Ourworldindata temprature (2025)

Table 2 reveals the global temperature. It is continually rising and poses significant challenges in different spheres of human beings and the natural world. Here, it is most important to note that the concentrations of CO_2-eq gases in the earth's atmosphere and its temperatures were relatively stable for more than 1,000 years before the rapid

increase in human-simulated gases. It began to increase rapidly after the Industrial Revolution in the West (IPCC, 2023) and now reaches a critical level that poses threats to human beings and the rest of the natural world. Climate change is one of the nine components that have already exceeded the planetary boundary (Richardson et al., 2023; Rockström et al., 2009).

Planetary boundaries consist of nine constituting elements—biosphere integrity, climate change, novel entities, stratospheric ozone depletion, atmospheric aerosol loading, ocean acidification, biochemical flow, freshwater change, and land system change (Richardson et al., 2023; Rockström et al., 2009). Of these nine boundaries, six—biosphere integrity, climate change, novel entities, biochemical flow, freshwater change, and land system change have already transgressed, and three—ocean acidification, stratospheric ozone depletion, and atmospheric aerosol loading—remain within the boundaries (see Figure 26). The transgressions of these six boundaries are heavily affected by human activities and cause irreversible damage to all spheres of human life and planetary well-being.

There is no linear and unidirectional impact of the decline of the suitability of these nine components for planetary well-being. The IPCC (2023) report suggests that human communities and governments should be mindful that, at 1.5°C to 2°C of global warming, more than 36% of the assessed species in affected regions (particularly global ecological hotspots) face a high risk of extinction. In particular, 9% (max 14%) of terrestrial/freshwater species are at very high risk globally at 1.5°C warming, and 12.2% of species in the eastern Himalayas are at high risk due to habitat loss from glacier retreat at 2°C warming. A 1.5°C increase in global warming, already exceeded, is estimated to result in a loss of 20-30% of the mass and volume of snow and glaciers in the Hindu Kush Himalayas (HKH). It is further projected that there will be 25-50% volume losses at 2°C of global warming.

The melting of glaciers and snow threatens approximately 240 million people in the HKH region, and 1.65 billion people live downstream. The report further indicates that between 2010 and 2020, human causality from floods, glacial outbursts, drought, and storms was approximately 15 times higher in highly vulnerable regions than in regions with very low vulnerability (IPCC, 2023). Likewise, it has been inferred that unprecedented anomalies have had to be endured by human communities and the planetary Earth. It has been shown that anthropogenic activities have

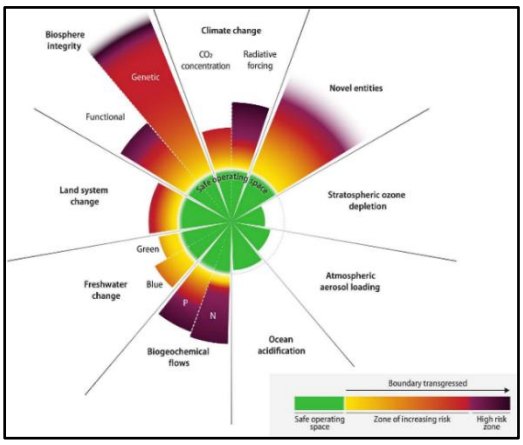
compromised the integrity of biodiversity, land use, freshwater resources, biochemical flows, and the disposal of novel entities in Earth systems.

In this connection, many researchers (Aaltonen et al., 2024; Biswas & Prakash, 2022; Fergusson et al., 2018; Harris & Jones, 2022; Joseph, 2018; Kahn, 2010; Kortetmäki et al., 2021; Puurtinen et al., 2024; Richardson et al., 2023; Roulston, 2022; Tiwari, 2016) have reached consensus on different levels of precision that the major causes behind the present crises are the dualistic thinking and neoliberal form of production and consumption. It signifies that, to address planetary well-being, it is necessary to disrupt the neoliberal mode of production (Joseph, 2018), challenge the anthropocentric narrative, and advocate for planetary solidarity and the end of exploitative structures (Karkulehto et al., 2022; Mori, 2024).

In my understanding, the colonial power centers have not only colonized the people but also exploited the natural resources and thus eroded and polluted them for their benefits; however, the so-called modern education has not condemned such devastating and exploitative mode of thinking through researching and teaching in schools and universities (Shiva, 1998). It indicates that past colonization was not only about conquering people and their lands but also about controlling and managing natural resources for maximum exploitation to advance colonial and corporate interests. After the end of the past colonialization which was made possible through the technology of the gunboat and ultramodern weapons, the newer form of colonialism, van Stam (2017) termed as a super colonialism which has been made possible through the different ways—social, political, cultural, technological, economical, industrialization and corporate business that make possible to perpetuate colonial exploitation and domination resulting the present global crises (Shiva, 2005; Slattery, 2006).

Figure 26

Planetary Boundaries



(Richardson et al., 2023, p. 4)

For enhancing planetary well-being, the Vedic philosophy seems powerful. It accepts Prakriti (matter or nature) and Purusa (pure consciousness) as eternal realities, and neither alone can produce the world (Biswas & Prakash, 2022). The Upanisadic

teaching of 'not this, not that' (Black, 2012) teaches that Prakriti and Purusa are not all, and they do not exist independently. Prakriti is not only the source of energy but also holds existential values. It is quite different from Western philosophy, which takes nature as an object for human manipulation.

Similarly, the Samkhya philosophy, the oldest Hindu philosophy, holds that "mind, sense, subtle organ, and the gross element are evolving from nature" (Nath, 2015, p. 130). The coexistence and interdependence of human beings and the planetary system were also well illuminated in the Rigveda and Atharvaveda, which describe the earth as our mother, the cloud or sky as our father, and us as their offspring (Biswas & Prakash, 2022). The Atharvaveda devotes the first suktta of chapter 12 to describing the interconnectedness and coexistence of human beings and the earth, and highlights the necessity of preserving the earth. The following three verses help us understand the role of the earth and nature in fostering the prosperity of human beings and the planetary earth.

सत्यं वृहदृतमुग्रं दीक्षा तयो बह्म यज्ञः पृथिवी धारयन्ति ।
सा नो भूतस्य भवस्य पत्न्यूरुं लोकं पृथिवी न कृणोतु ॥१२–२॥

(*Satya vṛhadṛutmugra dīkṣā tayāe bahrā yajñaḥ pṛthivī dhārayanti । Sà no bhåtasya bhavyasya patnyurum loke prithãvi na kṛṇotu*) (Acharya, 2002). It means that those who are devoted to fulfilling the rapacious desires and possess excessive materialistic ambition cannot preserve nature and the earth.

यस्यां समुन्द्र उत सिन्धुरापो यस्यामन्नं कृष्टयः संवभूवुः ।
यस्यामिदमं जिन्वति प्राणदेजत् सा नो भूमिः पूर्वपेये दधातु ॥१२–३॥

(Yasyā samundra uta sindhurāpo yasyāmannaṃ kṛṣṭhayaḥ saṃvabhūvuḥ. Yasyāmidamṃ jinvati prāyadejata sā no bhūmiḥ pūrvapeye dadhātu) (Acharya, 2002). Literally, it means that the earth has seas, rivers, lakes, ponds, streams, and other sources of water; it produces all forms of crops and fruits that supply necessary nutrients for all living beings, and everything depends on the earth. May that sacred land protect us, just as it has for our ancestors.

यस्यां वृक्षा वानस्पत्या ध्रुवास्तिष्ठन्ति विश्वहा ।
पृथिवीं विश्वधायसं धृतामच्छावदामसि ॥१२–२७॥

(yasyāṃ vṛkṣā vanaspatyā dhruvāsthiṣṭhanti viśvahā. Pṛthivīṃ viśvadhāyasaṃ dhṛtāmacchāvadāmasi) (Acharya, 2002). Literally, it means that the earth is the upholder of trees, vegetation, creepers, flora, fauna, and many medicinal plants—

render their service to all, remain perpetually steadfast. We humbly revere such earth—bearer of all-natural entities and nurturer of all life.

These verses teach us that the abundance of the earth and nature must be revered for the well-being of human beings and the planet. It also reveals the interdependence among nature, the earth, and human beings and calls for protecting the earth to sustain the future, emphasizing respectful human stewardship. Finally, it awakens human beings to believe in the natural order and to understand the ethical notion that people must respect and care for nature and the earth for the prosperity of the planetary earth systems. In fact, Vedic teaching helps for understanding and enhancing spiritual and ecological perspectives in learners through the development of mutual respect and empathetic relations by bringing forth the conception that all the constituent planetary spheres, celestial forces, natural entities, living beings, and earth itself deserve divine respect and therefore should be preserved without any alteration (Biswas & Prakash, 2022).

Moreover, the Vedic teaching of the five fires also illuminates the interdependence and coexistence of the planetary earth and human beings, as found in the C*hāndogya and Bṛhadāraṇyaka Upaniṣads.* During the discourse on transmigration, Pravāhaṇa Jaival taught the seers Uddālaka Āruṇi and his son Śvetaketu the knowledge of the five fires (pañcāgnividyā), which described human life as part of the cycle of nature that passes through different levels of existence. These five fires are lustrous fire (*dyulokâgni*), cloud fire (*parjanyâgni*), earth fire (*Ihalokâgni*), man fire (*puruṣâgni*), and young woman fire (*yoṣâgni*) (Black, 2012). Pravāhaṇa explained that when humans die they are cremated and travel in the form of smoke to the other world (first fire), where they become soma, as soma enter a rain cloud (second fire) and become rain, rain return to earth (third fire) helps produce grain including fruits, medicinal plants and all the edibles which are offered to man (forth fire), out of that offering semen is produced which when offered in the young woman (fifth fire) a baby is produced (Black, 2012; Tiwari, 2016). It suggests that life on earth is a constant process of becoming, it emerges, exists, grows, and upsurges. Nothing in this earth is useless, redundant, and dispensable; everything has its significant places in the cosmic web (Biswas & Prakash, 2022), and destroying and eliminating any lifeform and natural resources means killing the lives of human beings themselves. It signifies that everything on the earth is interconnected; any defect in the morphic field adversely affects the whole, and if a part is endangered, it has

repercussions on the whole. We need to bring such a conception into the mathematics classroom through the pedagogy that has substantial implications for nurturing the planetary well-being.

Chapter Summary

In this chapter, I have envisioned the futuristic pedagogy by incorporating three major attributes. The first attribute deals with enriching the engaged learning environment. To address this issue, I have offered strategies to enhance the engaged learning environment. In so doing, we have to relate mathematics to their immediate environment so that learners can easily capture the essence of mathematics through critical reflection and can make meaning of their learning. Likewise, we have to create a learning culture in which students, teachers, and other stakeholders engage in honest discourse that enhances their understanding through multiple lenses rather than focusing on competition to defeat others.

The second attribute fosters critical consciousness. I have argued that mathematics pedagogy should not be limited to imparting isolated mathematical knowledge and skills. The primary focus of pedagogical practices in ME is to prepare conscious citizens who can explore, challenge, and disrupt the oppressive forces that contribute to social, epistemic, and other forms of injustice. Conscious citizens can make wise decisions and act as change agents that might contribute to transforming society, the nation, and the world toward a more just society in which every person, irrespective of their belongingness and scholarship can live a dignified life. Moreover, the third attribute described the necessity of nurturing planetary well-being through mathematics pedagogy. It opens new discourse in critical mathematics pedagogy. It has generally discussed the social and political issues, positioning the oppressed people at the center. We should not restrict the critical pedagogy within this narrowly conceived boundary. It should consider the burning issues of the 21st century for the sustainability of the planetary earth, on which all life is possible.

Now, my readers might have a question about which assessment system is necessary to underpin the envisioned curriculum and pedagogy. To address this question, I have also envisioned a transformative assessment system in the next chapter, incorporating assessment as/for enriching epistemic agency, assessment as/for enhancing holistic learning, and assessment as/for cultivating healing praxis. These features of transformative assessment may help introduce an inclusive curriculum and a futuristic pedagogy in ME.

CHAPTER IX
CONSTRUCTING A VISION FOR TRANSFORMATIVE ASSESSMENT SYSTEM

I have already explored the existing assessment system in ME and have noted four disempowering features that seem to promote a victim-blaming culture, undermine an engaged learning culture, reinforce disciplinary egocentrism, and underpin epistemic injustice (see chapter VI). All of these features have taken assessment as a means of recognizing learners through marks obtained in examinations, which are designed and implemented by external authorities, potentially eroding students' creative, critical, and innovative thinking and their agency (Nieminen & Yang, 2023). The quantification and objectification of students' learning status are justified by 'colonial numerology', which measures non-measurable educational attributes, thereby allowing comparisons among students who are otherwise different (Appadurai, 1996). It could succeed in instrumentalizing the educational process by introducing a numerocentric culture of competitiveness and league tables (D'Agnese, 2015), supporting the creation of an unethical hierarchy and ecology of expertise (Golding & Kopsick, 2022).

To address the above shortcoming, this chapter presents the nature of a Transformative Assessment System (TAS) in ME. TAS is an approach to creating a learning environment in which teachers and students get an opportunity to engage in free and pure discourse (Dhakal & Lamichhane, 2016; Lamichhane, 2020; Taylor & Williams, 1992) in which they can relate the mathematical concepts with their sociocultural, historical and political milieu and illuminate interconnectedness and interdependences of the events and phenomena rather than taking them as isolated endevour. TAS not only quantifies students' learning outcomes but also makes them aware of the visible and invisible forces that encircle ME, thereby enabling them to interpret and draw meaning in their own settings. In this process, students' voices, their onto-epistemic practices, and value systems have been recognized, and they would feel empowered by the appreciation of their epistemic agency.

Isolated pedagogy and aligned assessment practices veil the interconnectedness and interdependence of human beings with the rest of nature. They become egocentric (humancentric) and thus act only for their own well-being at the expense of others. It is because of the domination of excessive materialistic thinking and actions, which are

governed by the neocolonial and neoliberal political-economic system that over-extracts natural resources and devalues and objectifies other living creatures for the fulfillment of human beings' greed and pleasure. In this context, we need to embrace such assessment systems in ME to create an environment that nurtures an empathetic worldview and responsible and accountable actions among students and teachers, thereby underpinning the resolution of the current crises. Considering these points, I have incorporated three significant features: enriching epistemic agency, enhancing holistic learning, and cultivating healing praxis to envisage TAS in ME.

Assessment as/for Enriching Epistemic Agency

I have used the term epistemic agency to refer to students' capacity to create, use, and connect mathematical knowledge within broader social, cultural, and political terrains. It is all about active participation in learning, exploring how knowledge is being made, and evaluating its relevance, which is far beyond the re/production and recipients of official knowledge. In this connection, the assessment as/for enriching epistemic agency refers to developing a capability to explore a core issue: how educational, social, and political power structures relate to and understand diversity and epistemic plurality. How are social and epistemic injustices perpetuated, and resources distributed and structured throughout the system? How do we enable learners to disrupt the hegemonic structure so that they become active and responsible citizens who contribute to social justice (Buchholtz et al., 2020)?

At this juncture of my inquiry, I have realized that the existing assessment practices need to be revised to align with the envisaged curriculum and pedagogical practices to bring transformative change in ME. In so doing, I have proposed some attributes of assessment that need to be embraced in ME, encapsulated in my lived experiences over more than four decades of the ME journey, as presented in the following narrative poetry.

Assessing learning in mathematics,
Improving learning culture
Recognizing students' capabilities
Valuing learners' diversity and voices
Dismantling the legacy of grades/marks.

Assessing learning in mathematics,
Fostering the power of questioning
Cultivating criticality and creativity

Raising critical awareness
Exploring socio-political injustice
Disrupting the dominant power structure.

Assessing learning in mathematics,
Revealing intricacies of coexistence
Illuminating the potency of synergy
Navigating the realm of meaningful learning
Connecting meanings to real-world scenarios
Refining problem-solving skills
Interrupting disciplinary egocentrism.

Assessing learning in mathematics,
Incorporating pluralistic visions
Authenticating learners' scholarship
Embracing accountability for learning
Endorsing ethical responsibility
Nurturing humility and humanity
Inspiring commitment to the welfare of others
Upending the process of homogenization.

In response to my query about possible alternative assessment practices to address the disempowering notions of existing assessment explored in our previous conversation, my research participants shared their views, which are captured in the following paragraphs.

Surya has featured his visions. *I have observed that student evaluations often seem disconnected from learning. The traditional forms of evaluation focus on measuring the ability to retain and reproduce mathematical facts, concepts, theories, and skills, which do little more than confine mathematics within the four walls of the classroom. We need to break the narrow conception of assessment that fails to recognize learners as cognizing beings. In doing so, we have to introduce alternative practices—such as project work, reflective writing, and dramatization—that help connect official mathematical knowledge with real-world problems. Connecting mathematical knowledge with the real world not only enriches conceptual understanding but also supports the development of critical and relational understanding of the subject matters that empower learners. For example, we can assign a simple project work for our school-level children to explore the interest rates*

imposed by the ruling class on the working-class people and make a comparison with the banking interest rates that help them to understand the exploitative behavior of the ruling class family in our social milieu, rather than asking students to solve the mere algorithmic problem. Likewise, assessment practices in ME should recognize learners as capable of managing their learning trajectories, respect their own ways of learning, and allow them to learn at their own pace and on their own time, while focusing on improving their learning outcomes.

In a similar vein, another research participant, Durga**,** ventilates her vision regarding the alternative assessment system. *I have had a bitter experience with the assessment of learning approach implemented in Nepali ME since the inception of modern education. It is not only related to ME assessment practices but also directly connected to curriculum, pedagogy, and education policy. The assessment of learning validates the existing curriculum, pedagogy, and educational policy, which serve as a resistance force against a paradigm shift in ME. The foremost factor that strained me was that it treated the learner as an object that could be easily manipulated and shaped by external forces, and the assessment of learning validated such activities. I have had recurring questions that persistently trouble me, but I have not had an opportunity to ventilate them. Am I not a cognizing being? If not, why then must I invariably follow the instructions and aspirations of others? Are the knowledge, skills, insight, and values I have acquired from my society, family, and culture meaningless? Is it true that our society is fundamentally uncultured?*

Figure 27

Example of Counting in Local Language (Gurung)

Local Name	English Name	Local Name	English Name
कि Kri (१)	One (1)	टु *Tu* (६)	Six (6)
इहि / निस Ngahee/*Nis)* (२)	Two (2)	ङि *Nni* (७)	Seven (7)
सों *Suon* (३)	Three (3)	प्रे *Pre* (८)	Eight (8)
प्लि P*li* (४)	Four(4)	कु *Ku* (९)	Nine (9)
ङ्ह *Ngah* (५)	Five (5)	च्यु *Chyu* (१०)	Ten (10)

I have felt discrimination in terms of language, in terms of social-cultural groups, and in ways of learning. I am subordinated as a mere vessel to be filled by information. For example, I have learned to count the objects in my own language, but when I entered formal schooling, these counting names disappeared (see Figure 27). Sometimes, when I mistakenly pronounced the name of a counting object in my class,

my teacher not only scolded me but also blamed our community for being uncultured. He warned me not to bring such meaningless practice into the mathematics classroom.

To address these shortcomings, we need to introduce an assessment system in ME that recognizes learners as cognizing subjects, allows them to exercise their local knowledge, and encourages them to advance that knowledge. It supports them in connecting mathematical knowledge to the immediate environment and real-world scenarios. In so doing, we allow students to express their learning in their own languages through storytelling, playing ethnodrama, project work, etc., to connect mathematics to the real world.

Likewise, Bishnu encapsulated his vision of alternative assessment as follows. *We have already discussed an inadequacy in the assessment of learning that limits pedagogical practices in preparing for upcoming tests. It compels the learners to cram the mathematical facts, knowledge, and theories, aiming to retain them during the examination. Those capable of regurgitating the already-stored mathematical information are labelled successes. If the maximum percentage of students solved bookish questions, it is regarded as quality education. In this context, how can we improve our ME?*

Assessment in ME needs to foster learners' agency so that they become creative, critical, and proactive, thereby becoming responsible and conscious citizens. In this regard, we need to introduce alternative assessment practices that enable students to do so. There is no royal road to accomplish such a challenging task. If we fail to consider spatiotemporal context and sociocultural and political scenarios, it again becomes a thumb rule, unable to create a flexible learning environment. It is an opportunity for learners to trace their learning status, revisit their learning trajectories, adjust their learning strategies, engage deeply in the learning process, relate their learning to their immediate environment and professions, and make meaning in light of their sociocultural and political milieus. The ways of assessing learning status through critical self-reflection recognize learners as cognizing beings capable of utilizing their epistemic scholarship and authorship. It is about how individual learners can incorporate ethical values, become change agents, and responsible citizens by resisting various forms of injustice.

From the above poem and narratives, I have come to understand that assessment practices in ME should not be restricted to the conceptions of 'what to know' and 'how to know'. The earlier one binds with the instrumental understanding

that alienates the teaching-learning activities within the realm of official knowledge. It devalues the learners as the objects of the assessment process, in which they were and still are measured by teachers or other external bodies through testing (Adie et al., 2018). Likewise, the latter concept seems somewhat more progressive than the first; however, it has again been confined to engagement in the learning process through a linear, iterative process. In Nepal, teacher-made tests rely on time-bound, rote regurgitation of knowledge, leaving little room for students to be creative-critical knowers and to take ownership of their learning through their epistemic agency.

Epistemic agency in relation to assessment practices in mathematics signifies the ideas of proactive learners in which their voices and onto-epistemological practices are recognized as their embodied forms of doing mathematics (Nieminen, 2024; Nieminen et al., 2024). Fostering epistemic agency is commonly understood as the opportunity for students to make meaning and interpret mathematical knowledge in light of their immediate environment and academic and professional settings. It helps students realize their learning status, weaknesses, and potential, which supports tracing their future journey.

In this context, how students are allowed to make meaning of their learning when assessing their learning status through assessment is well illustrated in the *Brihadaranyaka Upanisad, Prajapatiya Brahmana, Mantra 5-2-1* (see box 8).

According to the mantra, there are three descendants—*Devas, Manushyas,* and *Asuras* of *Prajapati*, the lord of the creators, dwelt as *Brahrmkarins.* After graduating, the *Prajapati wanted to evaluate the Brahrmkarins' learning as they were ready to return to their respective duties. Prajapati called the Devas* and asked the meaning of the word 'Da'. They replied, it means '*Damyata*'; be subdued, or to exercise self-restraint. *Prajapati* became happy. Yes! You have understood. Similarly, *Prajapati* asked *Manushyas to interpret the* meaning of '*Da*'. They told their Guru they understood its meaning. You told us, '*Datta*,' to develop the habit of giving, generosity, and sharing, and avoid greed. Guru smiled generously. Yes! You understood very well. Finally, *Prajapati* asked the *Asuras* the meaning of

त्रयाः प्राजापत्याः प्रजापतौ पितरि ब्रह्मचर्यमूषुः– देवा मनुष्या असुराः ;

उषित्वा ब्रह्मचर्यं देवा ऊचुः ; ब्रवीतु नो भवानिति; तेभ्यो हैतदक्षरमुवाच द इति;

व्यज्ञासिष्टा इति; व्यज्ञासिष्मेति होचुः, दाम्यतेति न आत्थेति; ओमिति होवाच, व्यज्ञासिष्टेति ॥५-२-१॥

श्रोतः Swami Paramarthananda Saraswati (2020) (Ed.). बृहदारण्यकोपनिषत् , प्राजापत्य ब्राह्मणम् ॥ ५-२-१ ॥

https://archive.org/details/upanishads_202012/11%20Brhadaranyaka%20Upanishad/

Box 8 *Take Home Message from Guru*

'Da'. They responded, you told us, *Dayadham*, to be merciful and compassionate and to renounce anger. Excellent! You did understand very well, said *Prajapati* (Pai, 2019). Finally, *Prajapati* encouraged them to carry these meanings throughout their lives.

The conversation between *Prajapati* and his disciples illustrates the meaning of assessment. There is no single interpretation or meaning of the syllable '*Da*'. Students have been allowed to make meaning through their reflections. Students were able to recognize their own limitations and the context, and make meaning accordingly, and their Guru also appreciated all the meanings and interpretations equally, even though they had completed the same course. After completing their course, *Devas* realized their own shortcomings through self-reflection, which led them to place undue emphasis on sophisticated lifestyles and to indulge excessively in carnal pleasures. They needed to suppress these habits. This context compelled them to make the meaning of '*Da*' as '*Damyat*', that is, to be self-restraint. Similarly, *Manushyas* comprehended that they tended to be selfish, greedy, and hoard more than they needed. They examined their own limitation and grasped the meaning of 'Da' as to be '*Datta'*, that is, give as much charity as possible to needy people. Finally, the *Asuras* also realized they had a cruel streak and did not hesitate to harm and kill in the pursuit of their own benefits. So '*Da'* is for *Dayadham*; for them. They have come to realize they need to renounce their anger and be merciful and sympathetic.

From the above discourse, I have realized that education is not about the homogenization of learners through the imposition of a modern curriculum (Apple, 2019; Slattery, 2006), a one-size-fits-all pedagogy (Freire, 2005), or standardized or teacher-made assessment (Ball, 2003). The idea of homogenization in higher education is meant to produce the same human resources as a form of education.

In this regard, Gandhi also rejected the idea of higher education as a homogeneous activity, independent of sociocultural context, and underscored local cosmological knowledge systems that disrupt creative-critical thinking (Patnaik, 2020). These processes really disrupt learners' epistemic agency—an ability to calibrate their own learning at their own pace, in their own time, and in their own ways (Nieminen & Lahdenperä, 2024). Moreover, the pervasive assessment practices in our schools and universities indoctrinate the conception of externally formatting education that devalues the learners by labeling them as less knowers, ignorant, and objects of education (Anthony et al., 2015), thereby instigating epistemic injustices (Dunne &

Kotsonis, 2022; Fricker, 2007; Nieminen & Lahdenperä, 2024). It indicates that to enhance epistemic agency, learners should be provided with opportunities to express their voices and perspectives in ways that enable them to draw on their scholarships, irrespective of their diverse backgrounds (Chilisa et al., 2017), as agentic actors and co-creators of culture and knowledge (Stetsenko, 2017).

In this regard, the notion of epistemic agency is to attribute the autonomy of scholarship practices in which they can freely choose their learning trajectories, make decisions regarding their ways, pace and time of learning, connect the mathematical knowledge and skills to the real-world problem and explore power dynamic which is often reflected in the form of systemic structural dominance within and outside the school and university premises so that they can contribute for the betterment of social just educational practices and lives their dignified life in their society and nation (Giroux, 2020a). It can be achieved by embracing a creative-critical pedagogical approach that fosters a culture of mutual respect and collaboration among stakeholders.

The role of collaboration and a culture of mutual respect in the learning process is described in the Shanti mantra of *Katha Upanishad* (see Box 9). Students and teachers generally chant the Shanti mantra to be ready to learn. It profoundly reveals the philosophical underpinning for fostering a collaborative culture of learning, blurring the hierarchical relation between teachers and students. They pray to God: may we be protected together, nourished together, work together with greater energy, have brilliant and effective studies, and eradicate animosity and foster collegiality (Pai, 2019). The implication is that the learning environment must be learner-friendly, in which learners feel safe to propose new perspectives, questioning existing paradigms, and scaffolding learners who hesitate to participate in discourse by acknowledging their knowledge, values, and skills. The concept of nourishment suggests a deep collaboration between mentor and mentee to enhance learning processes. It is a form of academic freedom and is essential for the flourishing of all forms of discourse, enabling every learner to express their views without fear or impairment (Taylor & Williams, 1992).

At this point of inquiry, I have realized that we must create a learning environment in educational institutions where students and teachers collaboratively engage in the learning process. The successes and failures are not solely the responsibility of students. Labeling them in different hierarchical levels is absurd. The

most significant attributes that need to be assessed are whether the learners are deeply engaged in the learning process or not, whether they scrutinize the information and can make wise decisions or not, whether they can critically reflect on their learning and improve their learning status or not, and whether they can solve the unpredictable or emerging real-world problems or not, etc. These attributes cannot be separated from the learning process and contribute to the development of learners' epistemic agency, enabling them to take control, ownership, and responsibility for their learning.

From the assessment perspective, we can comfortably assess the students' fluency, flexibility, originality in thinking and ideas, and eagerness to learn. It signifies that educational activities should focus on fostering a culture of learning, providing diverse learning environments, and energizing learners' eagerness to learn. It is a central point of departure that helps bring the most essential paradigm shift in the assessment system in ME. It again signifies that, without agency among the actors (teachers and students), they reproduced the systemic structure of oppression. The authority neutralizes and naturalizes the reproduction as the form of 'practical consciousness' of the actors, which gives rise to unintended effects (Craib, 1992; Rooyen, 2013) and non-transformative educational practices. That is, for a paradigm shift in assessment practices, we need to disrupt the narrowly conceived assessment that basically focuses on competition and homogenization, evolved during the Enlightenment period and underpinned by technological advancement (Horkheimer & Adorno, 2016) and offer the more diverse perspectives that emphasize on enriching creative-critical thinking, relational, cultural and critical self-reflective understanding and problem solving skills (Taylor & Taylor, 2019), thereby developing the epistemic agency.

ॐ सहनाववतु । सह नौ भुनक्तु । सह वीर्य करवावहै ।
तेजस्विनवधीतमस्तु । म विद्विषावहै ॥
ॐ शान्तिः, ॐ शान्तिः, ॐ शान्तिः
Om Saha nāvavatu
Saha nau bhunaktu
Saha vīryam karavāvahai
Tejasvi nāvadhītamastu Mā vidviṣāvahai
Om śāntiḥ śāntiḥ śāntiḥ

Source: Swami Paramarthananda Saraswati (2020) (Ed.). Katha Upanishad, Shanti Mantra.
https://archive.org/details/upanishads_202012/03%20Katha%20Upanishad/

Box 9 *Shanti Mantra of the Katha Upanishad*

Assessment as/for Enhancing Holistic Learning

I had the opportunity to study a course in education as a discipline at the Proficiency Certificate Level (PCL) at TU in 1992. The campus environment was very strange for me because I came from the countryside. I genuinely followed what our teachers said. I could not raise a question regarding the pedagogical activities on the campus. The general pedagogical approach was to bring a note copy and read aloud, and we were urged to write as fast as possible. The first chapter of the course discussed the meaning and definition of education. Our teachers wrote the definition of 'education' in English on a blackboard because we were unable to write the English sentences by listening. Among many other definitions, there was one I still remember: 'education is a means to all-around/holistic development of children'. I did not delve further into its meaning or interpretations. I memorized it by rote and easily retained it in the exam. I did so in almost all of the content areas of this course and other disciplines as well. I obtained better marks in the final examination. I was labeled as a good student. This is a brief synopsis of pedagogical and assessment practices in my academic journey.

As a mathematics educator and practitioner-researcher, I have critically reflected on ME practices and found that most educational activities (particularly pedagogy and assessment) were, and still are, devoted to preparing for examinations. What is the meaning of holistic education? Where does it exist? Is it used only to define education? Can we make it tangible in educational activities? These questions prompt me to contemplate the meaning of holistic education. However, I have observed some improvements in the curriculum, pedagogy, and assessment system, but the major orientation has not yet been changed**.** The provision of an internal assessment system in university education and project work in school education has been introduced to engage learners in the learning process (Sharma, 2020). However, there is a lack of proper implementation of an alternative assessment system guided by constructivist, progressive, and transformative learning intents (Rai et al., 2020). For example, Rai (2022) has argued that the semester system of graduate education at TU has been plagued by a colonial numerology mentality, thereby triggering non-transformative structuration in teacher education, even though alternative assessment systems are available.

In a non-transformative learning environment, students were less engaged in discourse, critical reflective practices, and creative activities. They could not critique

and question the rigid, time-bound structure of teacher-made or standardized tests, which not only detrimentally affect individual learning but also promote injustices against students with diverse epistemic, cognitive, and social backgrounds (Rai et al., 2020) and diverse emotional and spiritual aspects (Mahmoudi et al., 2012).

In this research, I have used the metaphor of assessment as/for holistic learning to indicate that assessment is an embedded practice in the learning process, in which students and teachers, major actors, can use their full potential. Assessment should not be separated from learning; it is an ongoing part of the learning process. Assessing learning means creating an environment that appeals to students and teachers, deeply engages them in the learning process, and connects mind, body, and heart (Gazibara, 2013) to help them make meaning of their learning. Assessment does not focus on segregating students into categories based on their grades (marks) in externally executed teacher-made or standardized tests.

A standardized or teacher-made test adopts a market-driven approach, underpinned by globalization and neoliberal socio-political and economic policies emphasizing competition and efficiency (McInerney, 2004). It reinforces utilitarian perspectives that focus on content strands and parameters to measure the rapid regurgitation of knowledge and skills to perform particular tasks efficiently and consistently, thereby neglecting learners' affective and spiritual aspects (Buchanan & Hyde, 2008).

Most educational assessment practices focus on the cognitive dimension of learners by implementing teacher-made or standardized texts inspired by international competitive tests such as PISA and TIMSS (Lamichhane, 2018). The cognitive dimension of learning is an integral part of the learning dynamics; however, artistic thinking, feeling, reflecting/ intuiting, appreciating, and recognizing are complementary for creating a holistic learning environment (de Souza, 2001) in which learners get engaged by connecting their mind, body, and heart (Shrestha et al., 2022), Moreover, the domination of cognitive learning separates the mind, body and heart of learners, and then they are urged to solve the given bookish problems. In our context, cognitive learning focuses on producing the 'right answer', but this does not ensure that the learning has reached a depth level. It remains far from holistic learning (de Souza, 2005), possibly deterring the transformative learning.

Holistic learning considers the cognitive, affective, and spiritual dimensions that enable students to engage meaningfully with real-world problems, exploring,

understanding, and making sense of them. The major orientation of holistic learning is to teach children rather than to teach particular disciplinary knowledge (Bhansali, 2024), aiming to prepare social, critical, conscious, creative, healthy, and prosperous citizens (Miller, 2010) that can contribute to creating a just and well-being society and nation. In this regard, holistic learning focuses on enriching learning environments that are highly conducive to students, in which they are treated as interconnected organisms of cognitive, affective, spiritual, social, political, and ecological spirits, and assessment as/for holistic learning has been taken as the way of nourishment of all these layers for the all-round development of the learners.

In this connection, Pawan *has argued that our students often seem afraid, worried, and anxious, which may lead to disengagement from learning and hinder their cognitive development. We must take these factors into account during teaching and learning activities and assessment systems. Every year, after the publication of SEE (previously SLC) results, some of the students have committed suicide. Who is responsible for such a condition?*

I think it is necessary to design rubrics for assessing students' learning status that are embedded within the pedagogical practices. These rubrics incorporate the diverse components that should consider students' creativity and critical thinking, arts of questioning, intrapersonal and interpersonal skills, 21st century skills, emotional traits, social activities, relational aptitude and many more so that we can easily assess the ability whether the learners will control and balance their emotional state, feel comfortable in learning, take social and personal responsibility, make a wise decision and demonstrating a willingness to become life-long learner or not. In so doing, we (including teacher educators, teachers, policymakers, students, and other concerned authorities) must focus on changing our deeply rooted conceptions of quality education. I have experienced that, in most cases, the re/formulation in curriculum, pedagogy, and the assessment system has not been properly implemented due to the obsessive beliefs of parents, teachers, students, and the media regarding the testing culture and marks (grades). As we have already discussed, the testing culture is one of the most significant factors that foster disharmonious and dishonest behaviors, including cheating and a blaming culture, in educational institutions and, thereby, in society. These attributes are contrary to the principles of education, which aim to produce ethical, responsible, socially conscious, creative, and conscious citizens who can contribute to a just society. From this perspective, I argue for the inclusion of

cognitive, affective, social, and spiritual dimensions in mathematics pedagogy and assessment systems for the holistic development of children.

Insisting on alternative assessment systems in ME, Bishnu has articulated his vision, emphasizing the integration of mind, body, and heart in ME programs. *When I critically examined our ME practice, which has been in place for nearly 200 years, I found it has been functioning within a highly confined sphere of disseminating, accumulating, storing, and regurgitating. We need to cross the boundary of this restrictive mode to advance ME; otherwise, it will likely remain stifled. ME has been criticized for failing to promote holistic learner development by prioritizing a unidimensional focus on cognitive development. As insider practitioners, we must realize that we cannot develop higher-order cognitive skills, such as problem-solving and creating.*

At this juncture, I am intuitively convinced that revising curriculum, pedagogy, and assessment systems is not enough. Changing the deeply rooted mindsets of teachers, parents, headteachers, students, and other concerned stakeholders is necessary. To date, most stakeholders (including me) have conceived of education solely in terms of external recognition or certification from schools and universities. The marks (grades) on the transcript are only one indicator of educational quality. It is one aspect, but there are other aspects—emotional, social, physical, and spiritual that need to be considered for the overall development of the students. We need to create a rational balance by connecting mind, body, and heart to nourish holistic ME.

The journey of mindful activities in holistic mathematics education transcends the traditional rote memorization approach, aiming for a deep conceptual, relational, and critical understanding to foster creative and critical thinking and problem-solving skills, helping learners take responsibility and ownership of their learning. Likewise, holistic learning is possible only when learners actively engage with real-world problems rather than merely participate in intellectual discourse. It is an experiential approach through multisensory engagement, beyond static, textbook-based instruction, to hands-on experiences that connect to practical situations. It also helps to connect the individual learner to the larger systems of nature that underpin embodied learning. Finally, connecting the heart to learning means taking into account the emotional, social, and spiritual dimensions of learning that support fostering a sense of ethical responsibility, interdependency, and coexistence, and recognizing and respecting other knowledge, values, and convictions that promotes a

harmonious relationship with all living beings and the non-living world by cultivating empathy, compassion and peace which undoubtedly are the attributes of the quality education.

Likewise, responding to my query regarding an alternative assessment system, Chandra has expressed his vision, including ecological aspects of learning, without excluding the cognitive, affective, physical, and social dimensions. *I have already told you in our previous discussion that we lost everything; there is nothing that can be claimed as ours in the educational milieu, which has a paramount effect on educational, social, and political life. You (indicating me) do understand. It is because of the overreliance on foreign practices that fail to recognize and acknowledge our sociocultural and historical learning context. Our ways of living, learning, and doing (livelihoods) are highly nature-friendly, and we, the people, revere our nature by acknowledging the interdependence and coexistence of human beings and the rest of nature. However, our education systems remain far removed from our lives and do not align with the environment in which we are growing. Here, I intend to revive our ME by integrating diverse perspectives of community practices. It means that we must foster curiosity and problem-solving through hands-on, experiential learning in which students explore, connect, and solve real-world problems. It helps solve unprecedented challenges faced by human society by fostering a harmonious relationship between human beings and nature and by promoting an empathetic vision and actions toward diverse learners and society.*

Likewise, it has sharpened self-management and the ability to control emotional traits. From these perspectives, we need to envision alternative assessment systems that disrupt the conventional—teacher-made or standardized tests — and consider the learning environment: the diverse backgrounds of learners, the accessibility of learning resources, and the emotional, spiritual, and ecological dimensions embodied in the learning process. Alternative assessment must contribute to learners' overall development by capturing the full spectrum of the learning environment and the status of learning. For this, it is necessary to abolish the measurement of student learning that neglects the other factors (as stated above) that have a powerful impact on creating a learning environment, inwardly and outwardly. In this regard, we have to inculcate the vision of assessing the overall learning environment in educational institutions and then evaluating the degree of engagement of the learners in the learning process for the upliftment of their conceptual,

relational, and cultural understanding, creative, critical, imaginative thinking, problem-solving, communicative, and collaborative skills that truly enhance the quality of education. In so doing, we have to deploy a range of flexible and emerging techniques, such as project work, reflective journals, portfolios, storytelling, community visits, and self-assessments.

From the above narratives, I have captured the essence of assessment as/for holistic learning component, inseparable from learning and aimed at enriching the learning environment. The inseparability of assessment from the learning approaches in which learners have an opportunity to engage, utilizing their potential by connecting their cognitive activities to the immediate environment, properly managing their emotions, recognizing their social responsibility, and respecting others' perspectives. However, these attributes are being replaced by content-specific teacher-made or standardized testing (Mahmoudi et al., 2012). It detaches learners from their culture and ways of learning, which adversely affects their cognitive development (Lakshmi, 2023), indicating the necessity of assessment as/for holistic learning.

Assessment as/for holistic learning is grounded in the belief that educational assessment should engage learners in the learning process rather than measuring learning achievement as a final product (Bhansali, 2024; Mitraa & Wadegaonkar, 2024). It focuses on how to enhance conceptual, relational, and critical understanding of the subject matters and encourages the learners to make meaning of learning objects at both the immediate and broader societal levels. Likewise, it enables learners to question the process and products through dialogue with peers, teachers, and experts. That is, assessment as/for holistic learning adopts multidimensional ways of accessing the learning outcomes of the learners with due consideration of cognitive, emotional, physical, social, and spiritual aspects for the grand purpose of improving learning status (Ali & Malek, 2025; Miller, 2019; Miseliunaite et al., 2022; Mitraa & Wadegaonkar, 2024) rather than leveling the learners into different hierarchical orders.

In so doing, we can use the strategies of outdoor community visits, educational excursions, mediation, and yoga as part of the learning process in which students engage physically, cognitively, and emotionally that help connect their learning with the immediate environment and nature, which support embodied learning (Miller, 2019; Miseliunaite et al., 2022). These activities provided the opportunity for learners to connect their learning with real-world problems through hands-on activities, supporting the enhancement of conceptual and relational understandings as well as

interdisciplinary knowledge and skills (Shrestha et al., 2022) that break the narrow conception of learning and extend it beyond the premises of schools and universities (Mitraa & Wadegaonkar, 2024). Involvement of students in learning through manipulation, artistic design, exploration of connectivity, and experimentation with sociocultural artifacts not only creates rich, meaningful learning experiences for them but also disrupts the narrowly conceived beliefs that cognition is entirely located within the individual head and insists the possibility of stretching across the individual, the cultural artifacts, and its context (Goos et al., 1999; Lave & Wanger, 1991).

In this connection, the social constructivist theorist Vygotsky (1978) explored the role of the multitude of opportunities to interact with sociocultural artifacts, as well as conversations with peers, family members, teachers, and more knowledgeable others, in mediating the learning process and contributing to cognitive development. Mediation is the process in which learners are encouraged to participate in their actions and interactions. It does not mean confining children as passive recipients of information and instruction from others. It signifies that learners' cognitive capability is developed through active participation in the learning environment and remains inseparable from sociocultural artifacts, interactions, and mediations by more knowledgeable others, as well as the social context in which learning occurred.

Social development, that is, social skills, is another key aspect considered in embracing assessment as/for holistic learning. To foster social skills, we need to create a learning environment in which students participate without any prejudice and impairment in dialogue and collaborative and cooperative projects that help develop social behavior—caring and sharing, respecting other people, their values and cultures, working for the collective good, and resolving social conflicts (UNESCO,1996). Likewise, developing interpersonal skills plays a significant role in holistic learning, in which students learn to communicate effectively and collaborate with peers to solve complex and emerging problems, thereby developing a sense of belonging to the community within and outside the school and university premises (Ali & Malek, 2025). Moreover, students need to learn to take social responsibility for resolving social conflicts peacefully and to encourage them to contribute to creating a socially just society (Skovsmose, 2023).

From the social justice perspective, educational institutions should operate within the equity principle in which every student has equal access to resources, they can share their experiences, there is no prejudice based on their sociocultural,

economic, ethnic and lingual backgrounds, and there is a culture of respect and empathy that create a collaborative learning environment where everyone feels valued and respected (Sundararaman et al., 2025). The feeling of self-respect, the acknowledgment of students' voices, and a cooperative learning environment contribute to academic performance and foster emotional intelligence.

In an educational setting, emotional intelligence refers to the ability to recognize, understand, respond to, value, and manage one's own emotions and those of others, fostering a respectful and supportive learning environment. In the initial stage, students must be aware of the learning objectives by listening attentively. Listening carefully helps them recognize the learning objects and respond by internalizing the significant roles these objects play in their lives, germinating certain beliefs and attitudes toward the learning objects and environment. Learners organize emerging values and beliefs into coherent systems by integrating and reconciling them with existing value systems, ultimately internalizing or incorporating the values that influence their practices (Krathwohl et al., 1964). These describe the role of emotional intelligence in the learning process that can be achieved through self-awareness, self-regulation, empathy, and social skills (Goleman, 1995).

Students having emotional intelligence can handle their stress and trauma, collaborate effectively with peers, teachers, and family members, face new challenges, demonstrate resilience thinking and action, and maintain a healthy balance among their academic, social, cultural, and personal lives (Mahmoudi et al., 2012; Miller, 2019; Sundararaman et al., 2025**)**. It indicates the need to incorporate learners' emotional states to create a holistic learning environment that promotes overall student success. In this regard, I have realized that curriculum, pedagogy, and assessment practices focus on emotional intelligence to reduce bullying and anxiety, thereby enhancing student-teacher relationships and motivating students to engage more deeply in learning (Aglah, 2024; Ali & Malek, 2025).

In this context, Mullis et al. (2012) found that East Asian countries have received the highest TIMSS scores, yet students did not feel confident in their mathematics learning. Similarly, the Program for International Students Assessment (PISA) revealed the same results (OECD, 2014). In both cases, the students who secured the highest marks in mathematics did not feel comfortable in mathematics learning and had low self-confidence. It indicates that, for children's overall development, we need to consider their emotional intelligence, which helps them focus

on the task at hand, feel comfortable engaging in learning, and filter out distractions. In this context, I have realized that assessment as/for enriching holistic learning should promote the learning environment in which teachers facilitate the learner to engage in the learning process in a natural process without having any pressures of achieving a goal as a final product to be turned out on demand of external authorities (Sundararaman et al., 2025).

Moreover, assessment as/for enhancing holistic learning entails aligning education with the fundamental realities of interconnected human beings and the rest of the world by disrupting the conception of education as fragmented and compartmentalized, which was initiated during the industrial revolution (Miller, 2019). For example, the fragmentation of economic development from the environment resulted in ecological devastation; the fragmentation of assessment from learning caused us to lose focus on learning, and the curriculum became teaching units to the test (Miller, 2019). In this connection, holistic learning emphasizes nurturing a deep sense of connection between self and others, fostering the flourishing of interdependence and coexistence between human beings and the natural world, and promoting the principles of compassion, peace, and empathy. The spiritual dimension of holistic learning is embracing a relational understanding of coexistence and healing-centric values and ethics (Gutiérrez, 2022), which teach us to hold dialogical and dialectical perspectives to respect and revere the permeated diversity in everything. Recognizing and accepting diversity in nature, without excluding human beings and their coexistence, encourages learners to take responsibility and work collaboratively to heal others and the natural world, and to remake themselves (Gutiérrez, 2022).

At this point of my inquiry, I have captured the major essences of holistic education as an approach, including connection—connection of school subjects, connection with a community of practitioners, connection with other people and the rest of the natural world and connection of head, hands and heart; inclusion—unity of diversities, not harming own and others values, perspectives and existence and balance—reaching for equilibrium through the dialectical and dialogical discourse, individual and group, contents and process, teaching and learning, rational and intuitive, knowledge and imagination, evaluation and learning, logic and vision, etc. (Miller, 2019). I have realized that these attributes of holistic learning offer a transformative vision by instigating continuous dialectical and dialogical discourse

among diverse views of education and learning, healing the educational discourse from highly fragmented worldviews.

Assessment as/for Cultivating Healing Praxis

In an era marked by accelerating ecological devastation, biocultural losses, climate change, persistent inequalities, social fragmentation, and violence, a human society faces profound crises that traditional education seems unable to address (Miseliunaite et al., 2022). It is because of the fragmented and reductionist assumptions inherent into curriculum, pedagogy and assessment systems of mainstream ME fueled by neoliberal monolithic paradigm often fall short in cultivating culture of empathy, harmonious relation to other people and nature, collaborative learning space, and planetary well-being, reeducating learning to the acquisition of discrete facts and skills that can be easily measured by standardized and teacher made tests (Joseph, 2018).

The testing and measuring culture in modern mathematics fosters and perpetuates competition, individualization, consumerism, acquisition, economic rationality, and many more implicitly indoctrinate the ethic of extinction and intolerance (Bollier & Helfrich, 2020) that unfettered exploitation of natural resources for the benefit of 'western humans' (Valero, 2023). It is an epistemological structure of disavowal (Hong, 2015) of Western education in general and ME in particular, detaching learners from their culture, society, and history, and has established an imperial agenda (Sriprakash et al., 2022) through an invasive neoliberal political-economic policy (Regmi, 2021a).

In a guise of the technological enflaming and endless economic growth, modern education un/intentionally has led to possibly apocalyptic ecological crises (Peim, 2024) and promotes the sixth extinction (Braidotti, 2019) immediately need to address for seeking to connect our fragmented world and foster the coherent path for sustainable future of the planetary Earth in which all forms of life should flourish not excluding the cultivation of emotional, social and spiritual well-being of learners. Cultivating a learning culture that supports learners' physical, social, emotional, and spiritual well-being fosters inner peace. It might lead the learners for actively engage in learning process by bringing forth the oppressive system and policy such as carceral classroom, inequitable school gatekeeping, epistemic injustices, ecological disbalance, climate change, biocultural losses and socially unjust practices into surface further contribute to create outer peace aiming for possibly overcome from these deficiencies

to heal wounded humanity and restoration of natural environment which is denigrated and distorted by anthropogenic activities. I have captured these perspectives articulated by my research participants under a metaphor of healing praxis.

Articulating her views on the transformative assessment system in ME, *Durga has stated that the role of assessment in education in general, and in ME, in particular must be redefined. We previously discussed that the assessment in ME has been treated as an external endeavor that creates a disempowering hierarchy, assuming that all learners have the same capabilities irrespective of their linguistic, economic, ethnic, cultural, and historical settings. In this regard, I have a bitter experience. At the beginning of the academic session, most of my students at the secondary and higher secondary levels expressed their worries and fears about the examination, whether they would succeed or not, and whether they would secure higher grades (marks). They repeatedly asked me how to obtain the highest marks in the final examination. It indicates that students were and still are highly pressured by the assessment system because marks subordinate learning. Students are already distracted, creating emotional, psychological, and spiritual imbalance in the name of providing modern education that seems disconnected from students' lived experiences. It is due to the isolation of pedagogical activities and assessment from learning, and to the overriding of standardized and teacher-made summative tests.*

Moreover, students also showed their enthusiasm for the implacability, implications, and relationships of classroom mathematics—basically, abstract mathematical concepts and their social, cultural, and historical settings in which they are nurtured. I do not claim that abstract mathematical knowledge and ideas have not had real-world applications; however, the ME curriculum and pedagogical practices in our context have not focused on exploring these aspects. If we enable learners to connect the mathematical concept and theories that are relevant to their daily lives practices and real world problems—trends of deforestation, possibility of glaciers outburst and its impact on lower basin people, worldwide expenditure trend on ultra-modernize weapons and its impacts of human society and natural worlds, comparison of cost of war and cost of education and social welfare, rate of inflation and minimum wages of labour and many more through the pedagogy and assessment in ME. That is, mathematical pedagogy and assessment should consider how personal, social, historical, and ecological milieus shape human experiences and enhance learning. It

further underpins the resolution of the world's current crises, making mathematics learning meaningful.

In response to my query about an alternative assessment to address the issues raised while exploring the disempowering nature of assessment, Pawan has shared his vision, as narrated below.

Designing and implementing an alternative assessment system in our context is not difficult. We need to address the emotional and/or psychological fear, anxiety, and trauma that our students have felt. I have experienced that our mathematics curriculum, pedagogy, and assessment are responsible for creating such fear, anxiety, and trauma. Students are unduly compelled to recite and remember abstract mathematical facts, concepts, and theorems to achieve the best marks in the final examination. I did not clearly understand the pure mathematical contents—Calculus, Abstract Algebra, Differential Geometry, Complex Analysis, etc. I focused on algorithms and lock-step procedures to solve the bookish questions and prove the given theorems, without a profound conceptual understanding of their real-world implications. For example, I do not understand why the Cauchy-Reimann theorem, Liouville's theorem, Taylor's theorem, etc., were taught to us. There are so many other theorems that I do not understand their meanings. The examination questions looked like 'state and prove the ……. Theorems'. I have memorized the statement of the theorem and its proof by rote, through endless drills. It is one of my unpleasant journeys. It gave me a panic attack and a headache because of the disconnection of learning content from our cultural, social, and historical background, and the present technological development. No one heard our voices.

More precisely, assessment should serve as the vehicle for student empowerment, inclusivity, and collaborative learning that accelerates learning rather than a mechanism of surveillance, ranking, and cultural violence, social and epistemic exclusion, and harm. In so doing, we have to deploy the project works, peer-assessments, self-assessment, debates, storytelling, etc. in which students develop interpersonal and intrapersonal skills, ways of communication, build the community relationships, skills of collaboration with others, learn to recognize and respect other ideas and voices, relate the mathematical concept to the real world context, explore the interdependency of the human beings and rest of the nature and understand the sociopolitical dimensions interplay with educational settings. We must impress upon students that their knowledge, skills, and ways of learning at home, in families, in

societies, and in professional fields are acknowledged and valued in formal schooling. Likewise, we have to create an environment in which they have realized that their knowledge and skills need to be enriched for success in further learning.

Proposing an alternative assessment system in ME, Surya has stated that *from the very beginning of the so-called modern ME, it has divorced learners from learning, perpetuating the conception of learning as synonymous with exam preparation. Through prolonged practice of this conception over the last two centuries in Nepal, the conception has become a deeply rooted belief among practitioners—students, teachers, curriculum designers, policymakers, parents, and other stakeholders. In my own experience, when I was assessed, I thought that learning meant preparing for tests, obtaining good marks, and that other learning activities were rather meaningless. I have found a rare fundamental shift in the assessment system in ME, even though there have been regular, periodic changes approximately every 10 years. In this context, a famous Nepali proverb, 'the tail is wagging the dog', seems to fit in our education system, in which the assessment system has governed the educational activities.*

In my opinion, an alternative assessment system must foster an assessment embedded in learning. Mathematics assessment should not focus solely on classroom mathematics, as life extends far beyond the classroom. Mathematical assessment must open a new avenue for the learners to become lifelong learners. When they engage with real-world phenomena, they can explore the interdependence and coexistence of human beings with the rest of the planet. It further encourages them to become active agents for nurturing the planetary well-being. Whatever name is assigned to such a learning process as an assessment approach, it should provide learners with an opportunity to be critical, reflective practitioners, allowing them to improve their learning and actions simultaneously. In my opinion, we need to instigate such an assessment in ME to help transform Nepal's ME practices.

From the above narratives of my research participants, I have captured the essence of mathematical assessment. Mathematics assessment is not an isolated task carried out at periodic intervals (monthly, half-yearly) or at the end of units of teaching and academic sessions. My research participants clearly stated that it is necessary to examine and disrupt the oppressive system that implicitly perpetuates systemic inequalities within and outside the school premises and causes emotional and psychological harm to learners (Kokka, 2023, 2019).

A healing-praxis informed assessment firstly heals the students suffering from fear, stress, anxiety, and trauma that have been instilled by the pressure given by the systemic structure of schools and universities to obtain the highest marks in competitive standardized tests (Kokka, 2023). It should begin by insisting on a collaborative learning environment in which each learner does not see his/her colleagues as competitors and does not necessarily beat them to be superior to others. In collaborative learning, peers can serve as more knowledgeable others and scaffold the learning process (Vygotsky, 1978). To enrich conceptual, relational, and critical understanding of the subject matter taught in school, a collaborative learning culture should be one of the approaches in which learners get an opportunity to share their perspectives, critique other views, and challenge the taken-for-granted assumptions. The opportunity to engage in discourse helps develop 21st-century skills—interpersonal and intrapersonal, communication, problem-solving, and creative thinking —that support the enriching conceptual, relational, and critical understanding necessary for transformative learning (Taylor & Taylor, 2019). While learning, every student should perform the assigned tasks, which make them responsible and enable them to contribute to resolving emerging non-routine problems. The embedded learning process becomes peer assessment and self-assessment because every individual is accountable for their task.

Figure 28

Suicide Case due to Failure in Examination

These two forms of assessment illuminate the meaning of Assessment as Learning (AaL), which emphasizes active engagement of learners in the learning process and the extent to which they have contributed to the knowledge-building process or the roles they have played in solving problems (Berry & Adamson, 2011). The collaborative learning culture can bring fundamental shifts in assessment in ME that break the conception of assessment as for competition, validated by external authority for external recognition that supports cultivating a learning culture in educational institutions in which students can engage in a prodding, probing, performing, and reflecting process, rather than merely solving the bookish problems

aiming to defeat the others (Andrade & Valtcheva, 2009; Yin et al., 2022). Likewise, the peer and self-assessment are crucial because they are not merely for grading the students' achievement on a particular content domain but embody into pedagogical practices in which major concerns are on whether students become active agents in their own learning or not, whether they become critical-self-reflective practitioner or not, and whether they are accountable for their learning or not so that they can take ownership of their learning. The AaL process supports the cultivation of students' intrinsic motivation so that they become highly eager to engage deeply in learning rather than remain passive recipients motivated by external stimuli (Earl & Katz, 2006; Lamichhane, 2018), thereby supporting healing from fears, anxiety, and emotional and psychological stress.

The sense of belongingness with culture, history, and soil contributes to building the relationship with peers, adults, teachers, family, and community members, fostering trust in which students are eager to act individually and collaboratively to address the community issues and improve the collective well-being, which Habermas (1972) called pure interest, in which personal desire, greed, and benefits are concealed by social benevolence. The deep engagement in real-world problems, in which learners can observe, feel, and recognize the social issues—discrimination, domination, and oppression- enables them to make meaning from the context and determine their roles and responsibilities, further encourages them to act toward social justice, fosters hope, healing, and optimism (Kokka, 2019). It signifies that the healing-praxis-informed assessment approach may help rehumanize mathematics by extending its spiritual dimensions (Gutiérrez, 2017, 2022), in which forgiveness, empathy, generosity, and reciprocity play a central role, possibly promoting transformative healing for students, teachers, and their community.

A traditional form of assessment of learning emphasizes mastery and achievement, in which teachers seem to endorse 'a grim win-or-lose contest' when teaching, that overemphasis on competition and materialist conception of life has led to a host of present crises of the world (Miller, 2002; Slattery, 2006). In contrast, a spiritual turn in education in general and ME in particular, that seeks the relational existence of people and the rest of the natural world. In this connection, I have explored two dimensions of spirituality in education, drawing on my own experiences and the narratives of my research participants.

The first one is related to the interhuman perspective, which emphasizes mutual respect, forgiveness, compassion, benevolence, and empathy, contributing to the co-creation of a society in which every person, regardless of their sense of belonging, can live a dignified life. The other perspective concerns the interdependence, coexistence, and reciprocity between human beings and nature for the sustainability of the planet earth.

In this context, I have recalled one reference from the *Ashtavakra Gita* that helps illustrate my conception of healing praxis as assessment in the educational context. There was a sage *Kahod***,** a renounced scholar who got scriptural knowledge from the famous sage *Uddalaka*. Once, when *Kahod* taught his disciples in his *Ashram*, he unfortunately mispronounced one stanza eight times, which was overheard by his son, who was still in his mother's womb. Son revealed it to his disciples, which enraged the sage *Kahod*, who cursed him; as a result, he was born with eight physical deformities and was later named *Ashtavakra.*

Later, sage *Kahod* was informed that the king *Janak* announced a large sum of money and other material rewards for those scholars who could defeat the royal preceptor *Bandi* in the *Sashathra* organized at the *Janak Yanjanshala*. The rule stipulated that any scholar who was defeated by *Bandi* would be drowned in a river. *Kahod* accepted the challenge and went to King *Janak's Durbar* to take part in *Sashathra.* He was defeated by *Bandi* and subsequently drowned.

Ashtavakra's mother stayed with her father, *Uddalaka*, where she cared for and nurtured her son. When *Ashtavakra* was 12 years old, he asked his mother who my father was and where he was. She did not want to tell her son everything. *Uddalaka* is your father. He did not believe. He is not my father, Maa. Rishi *Uddalaka* is like a father and my Guru. For years, why did you not tell me about my father? After that, his mother told him that Rishi *Kahod* is your father and explained all the events about how his father drowned after *Acharya Bandi* defeated him**.**

Immediately, *Ashtavakra* asked his grandfather, *Uddalaka*, for permission to participate in *Sashathra* with *Bandi. Uddalaka* replied, my son, you are yet to finish your education. Seeing your body and your age, they will not even allow you to enter *Janak's* court. Challenging Acharya *Bandi* in *Sashathra* is tough and seems impossible at this stage. *Ashtavakra* said, do true knowledge and intellectual wisdom depend on mere age and physical appearance? If *Bandi* defeats me, I will have repaid my father's debt; if I am victorious, then I will glorify my father. Please allow me to undertake

Sashathra with *Bandi*. I have full confidence in my education. Finally, *Uddalaka* allowed him and sent him with his maternal uncle, *Shvetaketu.* They reached *Janak's* court after receiving blessings from his grandfather and the Guru. The security guard stopped them. You are not allowed to go inside without permission. *Ashtavakra* said, we are looking for Acharya *Bandi* to challenge him to *Sashathra*. Oh, *Brahmins*, you are too young for the scriptural debate with *Bandi.* The security guard informed *King Janak* of their arrival and obtained permission to send them to the court.

When they reached *Janak's* court, the assembly members, scholars, Gurus, and Acharyas laughed for a bit. Witnessing this, *Ashtavakra* laughed too. Meanwhile, *King Janak* asked *Ashtavakra* why he was laughing. *Ashtavakra* seemed furious. Oh, king, I came here thinking of challenging *Acharya Bandi* to *Sashathra* in the midst of great scholars in your assembly, but I realized that this is an assembly of fools. Oh! The king asked your scholar why they were laughing. Who was the object of their laughter? King *Janak* said, you are not old enough to discuss scriptures with *Acharya Bandi*. It is challenging to debate with *Acharya Bandi***.** The one who loses to him in the debates has to die by drowning. Please go back and continue your study. *Ashtavakra* replied, "Can there be fear of death for the one who is immortal?" To give up one's life for a noble cause is not death. After that, King *Janak* allowed him to debate in the scriptures with *Acharya Bandi*. The debates look as follows.

Bandi: What is Prapanca?

Ashtavakra: Whatever is visible, whatever is called Prapanca. What is the meaning of whatever is visible?

Bandi: The subject of the mind and senses is what I know, that is, the meaning of what is visible. The one who is the seer (*Drasta*), who knows him, who sees one's own self?

Ashtavakra: No help is needed to see one's own self. Just like the sun needs no torchlight to be seen. It is self-illuminated.

……

Bandi: What is knowledge?

Ashtavakra: Knowledge of the self is true knowledge; that which frees us from sorrows, pains, bondages, ignorance, conflicts, illusion, and fantasies. It is defined as true knowledge. The true knowledge also frees us from duality—the concept of we have two, the concept of separation, the distinction of you and

me. Knowledge gives man a vision by which he recognizes his true nature as *Brahman*. What is the process of knowing Brahman?

Bandi: There are two ways of knowing *Brahman*. The first is to know what *Brahman* is actually not. That is to negate what is not *Brahman*, and after negating all the names, forms, qualities, and all the imperfect unchangeable things, to know the immutable one. The other way is to recognize the truth as it is. Truth is of the nature of existence; without it, the world has no existence. Hence, I am *Brahman*, you are *Brahman*, we are all *Brahman.* Thus, the entire world is *Brahman.*

……

Bandi: Is it possible to know it by logic?

Ashtavakra: No, but logic can play a supportive role. Can it be known through prayers and devotion?

Bandi: No, but prayer and devotion can play supportive roles. Can it be known through *Yoga* and reflection?

Ashtavakra: No, but *Yoga* and reflection can play a supportive role.

The ongoing debates seem to have no end in sight.

Suddenly, *Bandi* became speechless.

Bandi: I conceive my defeat. I am prepared to drown myself in the river.

Ashtavakra: *Acharya Bandi,* can you recall *Acharya Kahod*? I am the very son of *Acharya Kahod.* Today, I am the victor, and you are defeated. If I want, I will send you to drown in the rivers, but I shall not do so, *Acharya Bandi.* Because of the dreadful tradition you established in this *Durbar,* countless scholars have lost their lives. I do not want to continue such an ugly tradition. I hereby forgive you; it is my revenge, *Acharya Bandi.* Do not turn scriptures into weapons. Your majesty, scriptures help everyone to evolve, but weapons destroy life. It is an ancient fact that with violence, no one has ever won over another.

Bandi: I am the son of *Varuna* (the Water God). I forgive your father and recall him.

Ashtavakra and *Acharya Kahod* reunite**.** *Acharya Kahod* anointed his son with sacred water that healed *Ashtavakra's* deformities. From that day, *King Janak* abolished such inhuman activities within his *Durbar* and kingdom.

Here, *Sashathra* served as both a means of learning and a form of assessment, as each debater learned from the others and assessed their scriptural knowledge. There

is no clear demarcation between learning and assessment procedures. They embedded each other. It is a healing praxis because it heals *Acharya Bandi* from the intoxicated mental frame of reference of pride of knowledge, abolishes the tradition of turning sacred scriptures into weapons to destroy the lives of many sages, and supports the reunion of the fragmented family. Moreover, this *Sashathra* illuminates the potential of forgiveness, benevolence, and mutual respect for developing a consciousness in which learners experience transformation.

In addition to the above attributes of assessment as/for healing praxis, my research participants have also indicated the inclusion of interdependence, coexistence, and reciprocity between human beings and nature. I have already stated that mathematics becomes an uninteresting, dispassionate, and challenging discipline that remains in a holy place, uncontaminated by social, cultural, and political milieus (Lamichhane & Belbase, 2017). It detaches from the lives of most of the native and indigenous people throughout the world. They live harmonious lives and sacred reciprocity with nature because they do not think themselves superior to nature (Kokka, 2023). Most indigenous people worship nature as the source of energy and a lifeline. They know that they have been nurtured by nature and vice versa. But modern science, including mathematics informed by Western-Eurocentric thought, regarded nature as an object to be manipulated for the material benefit of human beings (Joseph, 2018). I do not argue against science and technological development, but my concern is that they need to serve the cultivation of human life and the natural world. It need not turn into a weapon that destroys human life and the planet Earth—the footprint we are eyewitnesses to: climate change, biocultural losses, deforestation, the plasticization of the ocean, and the expanding and out bursting of glacial lakes (Puurtinen et al., 2024).

Figure 29

Catastrophic Floods

In this context, we need to incorporate ecological spirituality into the mathematics curriculum, pedagogy, and assessment to develop learners' awareness that nature and human beings are inseparable and cannot imagine without the other. Rather than executing standardized tests, students are asked to share their experiences of how they can experience climate change, depletion of water resources, human casualties,

and loss of infrastructure due to floods, landslides, and their effects, etc., through storytelling and preparation of artistic paintings of these events that help develop the sense of interconnectedness and reciprocity (Buchanan & Hyde, 2008).

Storytelling is a beautiful way to craft and share events that can convince and remind learners to return to their place in their culture, history, natural environment, and spiritual journey (Kohli, 2024) that modern education has pushed away. The spiritual awareness of human suffering wreaked by current crises that are causing irreparable destruction creates threads for the sustainable future of the planet Earth and may lead learners to contemplate how they can contribute to resolving these crises.

Chapter Summary

In this chapter, I have outlined the features of the TAS to address the pitfalls and shortcomings of the traditional assessment system, which perpetuates the victim-blaming culture, undermines the engaged learning culture, fosters disciplinary egocentrism, and instigates epistemic injustices. I have captured the three major features of TAS. Firstly, TAS needs to enrich learners' epistemic agency, recognizing them as cognizing beings and their social, cultural, and historical scholarship as authentic and viable in a formal education. Assessment needs to foster a learning culture in which learners have the opportunity to interpret and draw multiple meaning.

Secondly, assessment should foster holistic learning. It needs to incorporate the cognitive, affective, emotional, spiritual, and physical aspects of learners to connect mind, body, and heart in learning, thereby making mathematics learning livelier. Finally, TAS has to cultivate a healing praxis that breaks the narrowly conceived view of assessment as a tool of competition, which, unfortunately, fosters the concept of extinction and intolerance in education and society as well. Moreover, TAS focuses on enhancing the concept of healing by acknowledging and incorporating mutual respect, empathetic visions, and collaborative actions that foster collective well-being and may prompt reflection on how to address the present glocal crisis. It helps open a new discourse in ME that supports the transformation of ME into trans/multi/ interdisciplinary terrains. In the next section, I share my reflections and insights throughout this transformative journey.

CHAPTER X
REFLECTIONS AND WAY FORWARDS

In this chapter, I reflect on the overall inquiry process of my research journey. I have described how my research issue emerged, how I conceptualized the problem and its context, and how I formulated research questions for this inquiry. Likewise, I have reflected on the methodological underpinnings and theoretical referents that support the exploration of the field texts and the meaning-making process before responding to my research questions. In this process, I have also explored the contribution of my research to methodological and conceptual terrains, as well as how postcolonial renditions align with national priorities. I conclude this chapter by articulating my final thoughts and outlining the way forward.

Exploration of My Research Issue

During this research journey, I have learned that there are two paths to formulating a research issue. The first approach involves exploring the research issue by reviewing existing literature and empirical research works. It teaches us that research issues are situated in a purely academic realm, somehow isolated from the researchers who navigate them. Likewise, it shows that knowledge exists there, and researchers carefully observe, describe, and present it as findings. Researchers become aloof spectators of the intricacies embedded in the issues.

The second approach involves exploring research issues through researchers' lived experiences in the field and problematizing them, drawing on the available literature and empirical research. It emphasizes the role of the researcher at the center because the researcher is an insider activist with prolonged lived experience and familiarity with the components and forces directly embedded in the research issue. It holds the view that the researcher's personal lived experiences are not an isolated endeavor; they are re/constructed through continuous interactions and engagement with particular disciplines, larger communities, and real-world situations.

My research issue has emerged from my lived experiences as a student, teacher educator, practitioner-researcher, and resident of a rural part of Nepal. My lived experiences—marked by emotional suffocation, marginalization, and systemic oppression. The educational environment rarely fostered opportunities to narrate and

listen to my stories, thereby rendering my lived experiences invisible within the dominant pedagogical discourse.

From an early age in school, I was socialized to believe that Nepal is fundamentally an agrarian nation, with agriculture at the backbone of its economy. It remains a reality today as well. More than two-thirds of the population lived in rural areas, where subsistence farming was the primary means of livelihood. However, our educational system, which was largely influenced by modern education, has rarely addressed the country's and its people's ground realities. Individuals who have committed to agricultural livelihoods, practiced environmentally sustainable, self-reliant farming, preserved and protected traditional knowledge, skills, attire, and cultural practices, and used their native language (Nepali and other indigenous languages) are marginalized. Likewise, people had developed a culture of social harmony, cooperation, and collaboration through the exchange of their knowledge, skills, toils, and livelihood goods. However, they are labeled as backward and uncivilized.

Moreover, another aspect of our education that I have experienced as an insider activist is that it has not only recognized local knowledge, skills, ways of knowing, and doing as worth including in the curriculum but also taught youngsters to condemn them. It regards the local cosmological knowledge system as nonstandard and lacking consistency and generalizability, thereby labeling those who possess such knowledge, skills, and ways of knowing and doing as illiterate and uncultured. I do not claim that all local cosmological knowledge systems are advanced. However, my argument is that formal education has to protect and promote these skills, concepts, ways of knowing and doing.

Last but not least, I have also encountered perplexing and disheartening events in my academic journey in ME. It is that event in which we (students of the university) remained ignorant and unaware of our own history of mathematics until the end of our university education. It is one of the events that has had a lasting, adverse impact on my mind. It has profoundly influenced my decision to pursue my research issue.

These three events offer glimpses into the emergence of my research issue, from which I came to understand that ME research is not isolated and should not be limited to purely academic terrain, but is instead influenced and shaped by social, cultural, historical, and political contexts. These contextual and insider experiences further enable me to formulate research questions.

Formulation of Research Questions

As mentioned in the previous chapters, I have had the opportunity to engage in the social, cultural, and political dimensions of ME after enrolling at Kathmandu University (KU) to pursue my Master of Philosophy (MPhil) in ME. I completed my MPhil dissertation by adopting a critical paradigm; however, upon reviewing it, I found that I had explored the phenomenon by limiting it to the internal power imbalance among institutional stakeholders, including curriculum designers, high-level bureaucrats, teachers, and students, and its impacts on ME. I have explored the effects of these forces on the formulation of images of curriculum, pedagogy, and assessment. During the early stages of determining my PhD research issue, I found that the external forces, in addition to internal components, also have a profound influence on ME, but largely remain invisible.

During the process of formulating my research questions, I explored the pervasive influence of modern education in our education system, which is rooted in Western-Eurocentric thought in its early stages and a neoliberal political-economic agenda in its later stages. It seems to be an ideology. Under the guise of modernity and scientism, all other forms of knowledge, skills, technologies, ways of knowing, being, and doing are rendered invalid. It has been established through schooling that modern mathematics is a sole prerequisite for personal, professional, social, and national development. In so doing, the foreign agencies (forces) that hold a Western-Eurocentric perspective have persistently reinforced their influence through various forms of interventions—foreign aid and debt, technical support, educational training, and infrastructural development—both in academic fields and in other sectors of the nation.

The Western-Eurocentric perspective, backed by neoliberal economic policy, forced the GSTR nations and their people to adopt this perspective, which has not only devalued non-Western knowledge, skills, and ways of knowing, being, and doing but also actively displaced them by blaming them for a lack of universalization, generalization, uniformity, and consistency. Such dominance has led to the marginalization of people from GSTR by rendering alternative, native, and local cosmological knowledge systems as obsolete or irrelevant to societal and national progress. In this context, I have captured the dominant practices in ME through three metaphors—the winner-takes-all approach to curriculum, pedagogy as/for developing

false consciousness, and assessment as/for instigating marginalization—that help me formulate my research questions.

The metaphor of the winner-takes-all approach to curriculum reveals the ghost of modernity and scientism that invisibly colonized people's minds and bodies (Dillard, 2012), thereby naturalizing and normalizing the adverse effects on educational sectors. Likewise, modern mathematics has been established as the peerless discipline. Its mastery paradigm blossoms the core essences of modern mathematics, characterized by universalization, standardization, and absolutism, which unduly celebrate and provoke the singular reality, objective epistemology, and value-neutral axiology. Moreover, modern education acknowledges only Western-Eurocentric thought that supports cultural assimilation (Pinar, 2004), in which learners from the GSTR are urged to accept it without questioning. More surprisingly, rather than dismantling the cultural imperialism produced by modern mathematics (Bishop, 1990), the uncritical adoption of foreign mathematics (Luitel, 2013) distracts students by focusing on trivial subject matter far removed from their lifeworlds. In this context, I have formulated my first research question: how has the colonial legacy informed the ME curriculum in Nepal, and how can my research participants and I envision an inclusive curriculum in Nepal?

The second research question in my inquiry concerned pedagogical practices in ME. The pedagogical practices in ME in our context seem to focus on a mastery approach. It is akin to the 'banking pedagogy' (Freire, 1993) in which the teachers deposit bookish knowledge into their students. Students are rarely encouraged to actively and thoughtfully participate in mathematical discourse because they are already trained to accept the taken-for-granted assumption (Freire, 2005) as knowledge, and raising questions about its very nature and its relation to larger social, cultural, and political contexts is labeled as undisciplined, antisocial, and anarchic activities. The hidden motto was to push aside students, keeping them unaware of the social, cultural, historical, and political entanglements in ME, so that they would remain silent and thereby give elite groups consent to continue their oppression and domination (Giroux, 2018).

Moreover, the colonial power center appears to control the mental universe of learners (Thiong'o, 1986) by hegemonizing them through the implementation of transmissionist pedagogy backed by modern absolutist views of mathematics. The transmissionist pedagogy fosters a culture of silence (Monchinski, 2008) that prevents

learners from engaging with social, cultural, historical, political, economic, and epistemic aspects (Fricker, 2007; Kemmis, 2008; Santos, 2016), thereby promoting false consciousness. After that, students can see everything within and outside the school premises as natural and neutral outcomes beyond their business and control, further preparing the ground for addressing different forms of injustice in society, nations, and the world at large. In this regard, to dismantle such disempowering pedagogy and offer a more inclusive and empowering pedagogy, I framed my second research question. How have my research participants and I experienced a colonial pedagogical legacy in a journey of ME, and how can we envisage a holistic pedagogy?

The third research question in my inquiry concerned the assessment system in ME. I have captured its attribute through the metaphor of assessment as/for instigating marginalization. I have found that students' learning outcomes are often measured using time-bound standardized or teacher-made tests administered by external authorities to ensure reliability and validity. It is nothing more than a colonial numerological approach that seeks to measure unmeasurable attributes in the educational milieu (Appadurai, 1996; Lamichhane, 2024). It ignores learners' epistemic agency (Nieminen & Yang, 2023). Likewise, I have experienced assessment of learning that focuses on learning by doing without reflection, which separates the known from the knower (Dewey, 2001). It focuses only on sharp learners from the mainstream elite ruling class and ignores students' social, economic, cultural, and linguistic backgrounds. That is, assessment of learning can only measure elite-group culture and ideology, which adversely affects the achievement of majority-marginalized students (Powell, 2022).

It further supports the development of a defeating mindset among practitioners, which may exacerbate social, cultural, and political conflicts by instilling social and epistemic injustices and economic disparities. Competition and efficiency promote a winner-takes-all approach and social Darwinism not only in educational institutions but also in other sectors of society and the nation. In this regard, I came to realize that to transform ME into a more inclusive and empowering one, we need to challenge and disrupt the traditional approach to assessing learning and offer a transformative assessment system in ME. In doing so, I formulated my third research question. In what ways does the colonial assessment system in ME constrain us within a unidimensional, standardized form, and how can we (my research participants and I) offer a transformative assessment system?

Reflection on Conceptualization of Postcolonial Rendition

At the initial stage of formulating my research issue and conceptualizing it within the context of Nepali ME, I encountered considerable dilemmas regarding my positionality in relation to anti-colonial, decolonial, and postcolonial perspectives, and which would best support my inquiry. Initially, I considered employing an anti-colonial approach to navigate my inquiry and interpret the field texts. It is because I have a deep-rooted impression from my second year of M.Ed., when I read the history of the development of mathematics in different civilizations, I did not find a single chapter devoted to the development of mathematics in Nepal. I have developed a conceptual paper entitled "A critical Rendition to the Development of ME in Nepal: An Anticolonial Proposal," which was published in the British Journal of the History of Mathematics. Later, when I critically reflect on my research issue and the relevance of my anti-colonial positionality in Nepal, a country that has never been formally colonized, I find it insufficient to explore colonial entanglements and providing an inclusive ME. Likewise, I have come to understand that the primary focus of the anti-colonial perspective is to raise political awareness among learners and encourage them to engage in the national sovereignty movement, primarily in formerly colonized countries. It often overlooks deeper social, cultural, linguistic, epistemic, and educational aspects that have been impacted by colonial power. It led me to consider the decolonial positionality in my inquiry process.

A decolonial perspective focuses on delinking, disrupting, and negating the colonial matrices, and revitalizing local and contextual ways of knowing through place-based pedagogy, the native language of instruction, and epistemic disobedience to Western-Eurocentric dominance. It over glorifies local, ethnic, and place-based curriculum, pedagogy, and assessment that might lead to another form of ethnocentrism. Likewise, it argues that colonialism has already ended, and we need to delink education from its remnants. However, it has overlooked a form of colonialism that has manifested through modernism and neoliberal capitalism, shaping people's lives and structuring the state accordingly (van Stam, 2017). Such a form of colonialism is more harmful than visible historical colonialism because it operates invisibly, thereby spreading to both formally colonized and never-colonized countries (Lamichhane & Luitel, 2023b). Yet again, I was confronted with a critical question: can a decolonial perspective be meaningfully employed in Nepal, which led me to adopt a postcolonial position in my research.

In search of clarity, I turned my attention to the works of key thinker and scholars—Andreotti (2011), Ashcroft, Griffiths, & Tiffin (2000), Bhabha (1994), Dei (2019), Gandhi (2019), Gramsci (1971), Fanon (1967), Luitel & Taylor (2010), Murphy (2007), Morton, (2007), Said (1978), Spivak (1988), Tarc (2018), van Stam, (2017), and Young (2016). I came to realize that colonialism has not ended yet. However, colonialism persists today through the elusive yet very harmful ways in which economic inequality, social injustice, cultural erasure, lingual imperialism, institutional elitism, epistemicide, global warming, and sixth extinction, to name but a few, are perpetuated that plague contemporary society. These legacies shape global power dynamics and continue to disadvantage, oppress, and subordinate formally colonized and non-colonized societies and nations.

Following this intellectual engagement, I ultimately decided to adopt a postcolonial perspective in my inquiry. I have conceived the term postcoloniality not as the end of colonialism, but as a profound influence across various sectors of the state mechanism, including the educational setting, that began with the commencement of the colonial system worldwide. That is, the postcolonial perspective is not limited to the time-bound analysis and interpretation of the social, cultural, historical, and political terrains. It is a generative and strategic essentialist position that always enables me to hold critical eyes towards emerging, dynamic, and complex forms of coloniality that have been manifested through modernism, neoliberalism, globalization, privatization, and corporatization, and their lingering effects on and reshape social, cultural, and educational sectors for sustaining the neocolonial relation.

Looking Back on My Theoretical Referents

Reflecting on my inquiry, I am highly enthusiastic about exploring and disrupting the colonial legacy in ME, aiming to envision an inclusive ME. I have experienced various forms of domination stemming from the colonial legacy (see Chapters IV to VI) in ME and have realized that, without unearthing its underlying invisible forces, it is challenging to offer an inclusive ME in Nepal. In so doing, I have faced some dilemmas in selecting anti-colonial, decolonial, and postcolonial perspectives to explore the perpetuation of colonialism in ME. As I delve into the related literature, I am inspired by postcolonial perspectives that provide a powerful lens to describe the impacts of colonialism on various sectors of nations, including education, from the beginning of formal colonialism, not only in formerly colonized countries but also in never-colonized countries like Nepal (see Chapter II). It focuses

on exploring the enduring effects on people's lives, the education sector, and other state mechanisms in formerly colonized and non-colonized countries.

Postcolonial perspectives suggest that colonialism has not ended yet, but it has manifested in the guise of modernism, scientism, capitalism, and neoliberalism. Through its new mutational forms, colonialism continues to linger, perpetuating adverse effects such as economic disparities, social and epistemic injustices, and the marginalization of the majority of GSTR nations and their people. In this context, it enables me to unearth the hidden forces, challenge, and disrupt the metanarrative of asocial, acultural, and apolitical ME created by colonialism to subjugate the native ways of knowing, doing, and being of the GSTR people. Likewise, I have employed postcolonialism as a broadly connected and complex theoretical perspective in my research that provided me with the lens through which I have zoomed out the larger scenario of ME in the context of Nepal (see Chapters IV, V, and VI), which also prepares the grounds for envisioning inclusive ME. Moreover, I have employed Habermasian Knowledge Constitutive Interest and Critical Pedagogy to zoom in on the issue, which further supports an in-depth understanding, interpretation, and meaning-making process.

The emancipatory interest (Habermas, 1972) enables me to interpret and make meaning from the field text, envisioning an inclusive curriculum, futuristic pedagogy, and a transformative assessment system. It helps develop a vision that fosters collective well-being over individual benefit, an autonomous learning environment over an authoritative one, and conscious, responsible citizens over indifferent ones. These attributes underpin the inclusive ME. Likewise, technical interest helps explain the narrowly conceived view of curriculum as preparing the technical workforce, which embeds a common notion of individual benefits, thereby instigating a conception of control and exploitation. It is also helpful for me to critique modern ME as shaped by neoliberal economic policy, which thingifies education through privatization and marketization. This process supports the subordination of alternative perspectives, values, and ways of knowing and being emanated from the lifeworld of people in the GSTR.

Finally, critical pedagogy enables me to challenge and disrupt the tyrannical pedagogical approach that serves only to enrich peripheral and superficial knowledge. It creates a systematic barricade that prevents learners from engaging in critical and creative discourse by reinforcing the colonial numerology of learning as an inevitable

aspect of education, fostering a culture of cultural reproduction. Likewise, a tyrannical pedagogy supports demarcating ME as an isolated and discrete discipline that remains far removed from the social, cultural, and political terrains, thereby fostering a magical/naïve consciousness among practitioners. In this context, mathematics pedagogy becomes an exclusive tool for concealing the oppressive, dominant systemic structure that invisibly and silently supports enduring social, economic, and epistemic injustices, violence, ecological crises, and many more. Moreover, instate of critiquing the existing pedagogical practices in ME which seems more disempowering, the critical pedagogical perspectives enable me to envisioning the futuristic pedagogy that not only unearth the concealing forces of oppression and domination but also suggest for empowering and inclusive pedagogy that would allow for the learners to be conscious citizen, and would make wise decision for crating the mutual and collaborative culture of harmony in which they can live their dignified lives. It also suggests not restricting my interpretation to exploring unjust practices and envisioning empowering practices within the human kingdom, but also illuminating the well-being of the planetary earth, where every life is possible.

Reflection on My Research Methodology

I faced a dilemma about which methodological designs would provide me with sufficient space to ventilate my disgruntlements and to incorporate the voices of my research participants in exploring the colonial entanglement in ME and in offering an alternative ME.

Initially, I had considered employing evocative auto/ethnography (Bochner & Ellis, 2016) to explore colonial presences through my research participants and my lived experiences as an insider actor of ME in Nepal. Later, I realized that expressing our emotions, feelings, thoughts, senses, affections, and convictions helps explore the existing colonial presences in ME, but it is not sufficient to envision an inclusive ME in the context of Nepal. After that, I have considered critical auto/ethnography (Boylorn & Orbe, 2014) as a way to navigate my research journey. It enables me to take a critical stance and explore the hidden forces that sustain colonialism. Again, I become doubtful whether this approach could successfully craft my journey, in which I have accomplished two tasks: exploring the colonial legacy and envisioning an inclusive ME in the context of Nepal.

I engaged in reading scholarly works of scholars—Apple (2019), ideology and curriculum, Paraskeva (2016), curriculum epistemicide: Towards an itinerant

curriculum theory, Shapiro (2020), violence and the crises of meaning in neo-liberal world, Ball and Collect-Sabe (2025), against school: thinking education alternatively etc., I came to realize that critical posturing is necessary in my research but limiting within this paradigm might not help envision a transformative ME. After extensive contemplation of the nature of my study and rigorous engagement with my research questions and theoretical perspectives, I have come to realize that employing a postcolonial auto/ethnography is appropriate, as evidenced in our publication (Lamichhane & Luitel, 2023b).

In my inquiry process, postcolonial auto/ethnography enabled me to unearth the colonial legacy in ME by revealing power dynamics, reframing reality as a process of relational becoming, and honoring pluralism. It further suggests taking a dialectical approach during the inquiry process to generate synergistic meaning from seemingly contradictory phenomena, without losing their inherent essence and attributes. It helps enhance the culture of harmony by incorporating the notions of mutual respect, interdependence, and coexistence of phenomena like the West and East, data and voice, sense and emotion, description and vision, analytical and perspectival, mind and body, theory and practice, intimacy and reciprocity (Denzin, 2019), nature and culture, materialism and spiritualism, to name but a few. The dialectical interplay between these constructs gives rise to informed action, thereby leading to transformative praxis (Freire, 2005; Grundy, 1987; Maseko, 2018).

Likewise, the postcolonial auto/ethnography instructs me to adopt the empathetic and inclusive views as the ethical responsibility of the researcher for ensuring the parallel and equitable inclusion of the otherwise unheard voices, perspectives, ways of living, knowing, and doing in the transformative mathematics curriculum in which learners get an opportunity to be deeply engaged in learning irrespective of their origin and belongingness (Smith, 2012). That is, postcolonial auto/ethnography offers a view that research should not be limited within the terrain of academic discourses, it must be viable and must develop the agency in researcher, research participants and readers so that they become change agents, thereby orientate in re/curing the distorted history, reviving the loss identity, revitalizing the lives of the marginalized people, recognizing voices, valuing cultural ways of knowing and doing, developing a culture of respect and offer the inseparable, interdependence and coexistence views of nature and culture for sustainable future. It is a healing process that truly occurs when culture is not filtered through neoliberal perspectives (Gullion

& Tilton, 2020) and does not place human beings as inherently superior to nature, thereby avoiding exploitation (Shiva, 2005). That is, postcolonial auto/ethnography supports the ignition of a transformative vision of solidarity that transcends boundaries and helps bridge the gap between the human cultural and natural worlds. It encourages inclusion and the reimagining of new relationships that honor interconnectedness, coexistence, and mutual respect, thereby creating ecological harmony and cultural inclusivity to achieve a peaceful, socially just, sustainable, and prosperous future.

Addressing My Research Questions

In my inquiry, I have formulated three research questions to navigate my research journey. Every research question has two parts: the first part is devoted to uncovering the forces behind the perpetuation of colonial remnants in ME, and the second part is oriented towards envisioning inclusive mathematics in Nepal. I have attempted to address these research questions, organized into six chapters (Chapters IV-IX). I have spent the first three chapters (Chapters IV to VI) exploring the intricacies of colonial endurance in ME, and the following three chapters (Chapters VII to IX) envisioning inclusive ME.

In addressing the first part of the first research question—how has colonial legacy informed the ME curriculum? I explored the colonial perpetuation in ME through a reflective journey of my research participants and myself. I have realized that my educational journey in ME felt like a dark tunnel, where it was very difficult to find discernible signs of life. It is an exceptional journey through a void, absent of scenery, society, culture, and history. Only abstract mathematical definitions, symbols, formulae, theorems, principles, and their derivations populated this terrain. These have neither recognized me nor been recognized by me. Despite this profound estrangement, there was a compulsion to continue my journey toward a destination that, paradoxically, could rarely be reached. Likewise, I have revealed that our ME unknowingly celebrated the exclusive view of reality that restricted learners within the narrowly conceived, mathematics-as-the-universal, objective, and value-neutral framework, which rarely acknowledged the plurality in knowing and doing. A disempowering conception of universalization, objectification, standardization, and neutralization is promoted under the guise of modernism and scientism, backed by neoliberalism; a mutated form of colonialism (Quijano, 2000, 2007) thereby perpetuates epistemicide (Santos, 2016).

In addition, modern education, in general and ME in particular, supports the creation of a false metanarrative that those who possess various forms of skills and knowledge (see Chapters I and IV), particularly those emanating from their lived experiences and transmitted by their ancestors, are tagged as illiterate. Modern mathematics practice has recognized only the Western-Eurocentric form of mathematics as worthy of inclusion in the mathematics curriculum, while relegating all other forms of knowledge from GSTR countries and their people, serving as a secret weapon of imperialism (Bishop, 1990). Likewise, the colonial power center strategically instills the consumerist ethos among practitioners through their neoliberal sociopolitical and economic policies, employing seemingly neutral yet audaciously harmful strategies such as financial aid, consultancy services, teacher training, curriculum formation and revision, technological support, and infrastructural development, to name a few. They unreservedly illuminate the materialistic perspectives and individual benefits that foster a mentality of management, control, and exploitation of human labor and natural resources for the fulfillment of personal greed, casting a shadow over social well-being and a sustainable future. The consumerist ethos has permeated society to such an extent that it has led to corruption, social violence, insecurity, and economic disparity (Slattery, 2006), climate change, and the loss of biocultural diversity (Taylor & Taylor, 2019), among other consequences. I have captured all the attributes mentioned earlier through a dead map of the curriculum, an exclusive view of reality, neutralization, and naturalization of epistemicide, and hegemonic colonial ideology. After exploring such disempowering notions of existing curricula, I have turned my attention to envisioning an inclusive mathematics curriculum.

As the insider-active practitioners of ME in Nepal, my research participants and I offer inclusive and empowering ME. I have captured the features of inclusive through three metaphors—curriculum as/for extolling zoe, eco, and techno vision; curriculum as/for cultivating spiritual consciousness; and curriculum as/for fostering a transformative praxis.

I have realized that ME has to play a double role in the present 21st century complex burgeoning world. First, it has to explore, challenge, and dismantle the oppressive structures—educational, social, economic, lingual, to name but a few that suppress and dominate the GSTR countries and their people for creating a socially just society, nation, and the world in which people, irrespective of their scholarships and

belongingness, can live their dignified lives. Secondly, ME must foster values of interdependence and coexistence among human beings, non-human creatures, non-living objects, and the technological advancements of the 21st century for a sustainable future. In doing so, it is necessary to develop a spiritual consciousness that transcends competition, consumption, and corporatization by cultivating a culture of mutual respect, ethical values, nonviolent attitudes, and critical responsibility to heal wounded humanity and the natural world. Moreover, the mathematics curriculum needs to foster transformative praxis by creating sufficient space for action and reflection. The praxis is a continuous interplay between actions and reflections. I have realized that a constant dialectical interplay between action and reflection is necessary: theoretical reflection without action produces empty verbalism, while ignoring reflection in action amounts to mere activism that might lead to cultural reproduction (Freire, 2005; Herbal-Eisenmann, 2023).

In addressing the second research question—how have my research participants and I experienced a colonial pedagogical legacy in our journey through ME, and how can we envision a holistic pedagogy, I have devoted two chapters (Chapters V and VIII). In chapter V, I examined how pervasive pedagogical practices in mathematics were underpinned by neoliberal sociopolitical economic policy, a mutated form of colonialism. Likewise, in chapter VIII, I envisioned a futuristic pedagogy to address these shortcomings and offer a vision for transformative learning.

In my inquiry, I have found that a conformist/informative/mechanistic pedagogy is prevalent in ME, focusing solely on instrumental mastery of subject matter, in which teachers and students become uncritical spectators of the social, cultural, and historical intricacies of mathematics. The pedagogical activities in ME often compel students who are future teachers and active social agents to comply with authority, thereby strengthening existing social structures. Even so, teachers, students, policymakers, curriculum designers, and other concerned authorities appreciate such pedagogical practices, which led me to conceptualize a pedagogy for developing magic/naïve consciousness. Likewise, from my own lived experiences and narratives of my research participants, I have revealed that the mathematics curriculum and its pedagogy have not considered the issues of social inequalities, including economic disparities, unequal access to resources, and the decision-making process as relevant in mathematical discourse, thereby practitioners become aloof selectors of the social injustices and oppression.

I have also unearthed that mathematics pedagogy has only recognized Western ways of knowing, which push our local cosmological knowledge systems and ways of knowing towards extinction. It has not acknowledged students beyond mainstreaming as epistemic beings, neglecting their voices, perspectives, and epistemic practices, holding prejudices against their origins and scholarship. It signifies that existing pedagogical practices have not challenged and disrupted the social and epistemic injustices perpetuated in educational institutions, society, and the nation (Fricker, 2007). I have found that, rather than exploring the present crises of the world—global warming, climate change, biocultural losses, sixth extinction, violence, drought, famine, to name a few—mathematics pedagogy conceals these issues by restricting students within a pure mathematical terrain and to instrumental mastery of textbook questions, even though modern mathematics has the power to model these crises. Most of the content, if not all, can be taught by relating to real-world problems. It is a major contradiction that I have revealed throughout Chapter V and raised the question: why have our university, the concerned authority, and practitioners not contemplated these issues?

In chapter VIII, I have envisioned a futuristic pedagogy aligned with the envisage curriculum, fostering the zoe, eco, and techno visions, spiritual consciousness, and transformative praxis, and addressing the pitfalls of existing pedagogical practices. I have characterized an engaged pedagogy that presents mathematics as a social, cultural, historical, and political discipline embedded in the lifeworld of learners, offering opportunities for deep engagement irrespective of learners' origins and scholarship. It dismantles the narrowly conceived view of pedagogy as informing and re/confirming taken-for-granted assumptions about mathematical knowledge and maintaining the status quo for the sake of social orders, norms, and values, and offers the view that aims of mathematical pedagogy are to produce conscious citizens who can make wise decisions. The major shift I have proposed in my inquiry is that we do not need to teach mathematics to master technical knowledge, concepts, and skills; rather, we need to teach children so that they become conscious citizens. Mathematics pedagogy focuses on enhancing feelings of affection, love, mutual respect, tolerance, forgiveness, compassion, empathy, and spirituality, and orients toward fostering interdependence, interconnectedness, and the coexistence of humans with the rest of nature, which would certainly help develop a sustainable future. In the present 21st-century world, mathematics pedagogy should not be

restricted to an instrumental mastery of silos of disciplinary knowledge and skills, but it must offer enough spaces for developing the social and ecological solidarity for the planetary well-being that would support healing the wounded humanity, non-human creatures, and the planetary earth as well. In this regard, I have offered the visions of futuristic pedagogy captured under the three themes—pedagogy as/for enabling engaged learning, pedagogy as/for fostering critical consciousness, and pedagogy as/for nurturing planetary well-being.

In my understanding, the first feature of the envisaged pedagogy supports deep understanding and learning by connecting with their social, cultural, and political settings. The second feature underpins learners' exploration of the disempowering forces that restrain mathematics pedagogy within the mastery paradigm, disconnecting it from sociocultural and political perspectives, and enables them to actively participate in creating a socially just society and nation. Finally, the third feature illuminates the interconnectedness of human beings and the rest of the natural world, encouraging learners to build social and ecological solidarity and thereby contribute to a sustainable future.

In responding to the third research question, in what ways does the colonial assessment system of mathematics education restrain us within a unidimensional-standardized form, and how can a postcolonial perspective help us (my research participants and I) offer a transformative assessment system? To address this research question, I have devoted two chapters (Chapters VI and IX). Chapter VI was devoted to unearthing the colonial entanglement in assessment practices, whereas Chapter IX examined the nature of TAS through a postcolonial lens.

In my inquiry, I have found that the assessment approach used to evaluate a student's learning outcomes is a powerful tool and technique that seems to govern the educational system. Due to an overemphasis on the assessment of learning, educational institutions appear to be training centers or factories that produce a homogeneous workforce, a product needed for neoliberal markets and developed countries. It disregards students' social and cultural backgrounds, economic status, and linguistic proximity. In this context, I have captured a disempowering notion of assessment of learning under four themes: assessment as/for instigating a victim-blaming culture, assessment as/for demolishing engaged learning culture, assessment as/for enriching disciplinary egocentrism, and assessment as/for reinforcing epistemic

injustices. To address these pitfalls of the existing assessment system in ME, I have envisioned the TAS.

In my inquiry, I have portrayed the attributes of TAS in ME in Chapter IX. I have captured the features of the TAS under the three broad perspectives—assessment as/for enriching epistemic agency, assessment as/for enhancing holistic learning, and assessment as/for cultivating healing praxis.

A TAS has not restricted students to regurgitating mathematical knowledge, skills, and theorems in the name of assessment. It focuses on developing proactive learners who can learn, create, connect, and reflect on mathematical knowledge within the broader spectrums of their lifeworlds rather than restricting them to procedural/mechanical learning. I have explored that AfL underpins a colonial numerological system that promotes a conception of competition in education that orients learners to develop a defeatist mentality (D'Agnese, 2015), further supporting the creation of an unethical hierarchy and an ecology of expertise that relegates learners to non-epistemic ends (Golding & Kopsick, 2022). In this regard, TAS focuses on fostering a learning culture in which learners deeply engage in the learning process through their onto-epistemic scholarship. It challenges the homogenizing approach to learning and assessment and acknowledges learners' epistemic agency. Likewise, TAS has not only focused on the cognitive domain, but it also embraces the dynamic interplay among the cognitive, affective, emotional, physical, and spiritual dimensions of learners to foster a holistic learning environment (de Souza, 2001). The central argument of TAS in ME for creating a holistic learning environment is to teach children rather than to teach disciplinary knowledge of mathematics (Bhansali, 2024), aiming to foster learners' holistic development so they become conscious citizens and can make wise decisions.

Finally, the TAS focuses on healing praxis. Firstly, a healing praxis-informed assessment in ME focuses on healing students from fear, stress, anxiety, trauma, which are primarily created by a neoliberal political economy and its accompanying education policy by instigating competition, individualization, consumerism, economic and scientific rationality, and many more. Likewise, healing praxis needs to deconstruct the neoliberal political economy in which extinctions are the rule and survivability is an exception (Bollier & Helfrich, 2020) and reconstruct assessment in learning far beyond the colonial numerology. In this connection, TAS is not limited to colonial numerology; it offers a learning environment that fosters the notion that

education should not be a weapon of destruction but should glorify humanitarian and ecological values through the development of spiritual consciousness. The spiritual consciousness supports the development of an empathetic vision in which learners can recognize the interconnectedness, interdependence, and coexistence of human beings and the rest of nature, so they can contribute to planetary well-being in which all lives can flourish. It signifies that assessment as/for healing praxis is a way of learning and a process of becoming conscious citizens who are not only aware of the present crises of the world but also contribute to resolving them, which is the true essence of education.

Contribution of My Inquiry

This research project has centered on addressing the overarching research question: How has the colonial legacy embedded in ME in Nepal, and how do my research participants and I construct visions for inclusive ME in Nepal? It has emerged from my lived experiences from the early years of schooling to university education. It certainly illuminates a way of formulating and problematizing the research issue, as well as of setting research questions, from insider perspectives. It might be beneficial for practitioner researchers, readers, and teacher educators to understand how research issues emerge and how research questions are formulated from insider perspectives by incorporating the lived experiences of the researcher. Likewise, my research has contributed to conceptualizing a postcolonial rendition of ME in Nepal, a country that was never colonized. I have conceptualized that colonialism has not yet ended, but has manifested in various mutational forms—capitalism and neoliberalism under the guise of modernism and materialistic development. In this regard, I have used postcolonial perspectives as a theoretical lens to explore how colonial legacies have been perpetuated in the educational landscape since colonialism's inception and their impacts across different sectors of the nation, including education. The postcolonial rendition of ME is seemingly an unexplored field of research in Nepal that might appeal to my readers, practitioner researchers, and mathematics educators, and prompt them to engage in a new discourse on ME.

Moreover, my inquiry supports establishing the notion that ME research is not a neutral activity but a political venture shaped by the power dynamics of institutions, societies, and nations. From this perspective, mathematical reality is in a process of becoming rather than a static state, and to reveal it, we have to employ multiple ways of knowing. I have used a postcolonial auto/ethnography featured in our publication

(Lamichhane & Luitel, 2023b) to explore the social, cultural, historical, and political intricacies in ME. It also opens a new line of discourse in ME research that would be beneficial to my readers, practitioner researchers, mathematics educators, and students.

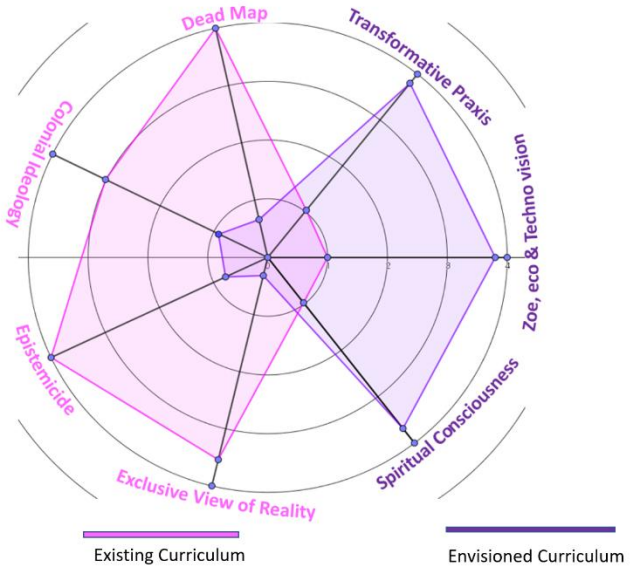
In this inquiry, I have spent three chapters (Chapters IV-VI) exploring how the colonial legacy is rooted in ME and the extent to which it impacts ME's curriculum, pedagogy, and assessment system, which have not yet been adequately addressed in Nepal. I explored that our ME has rarely been embedded in our soil, culture, history, and onto-epistemic pluralism. It uncritically adopts Western-Eurocentric thought and onto-epistemic practices, which are supported by a neoliberal socio-political economy in which only economic rationality and scientific logic are recognized, even though these forms of practices and logics have not been well implemented in our context, and all other forms of logic emanating from the lifeworlds of the people of GSTR countries are discarded.

Likewise, through a prolonged enactment of such ME, it has exerted a forceful assimilation, in which teachers, practitioner researchers, students, other concerned authorities, and parents have begun to accept their own domination. Forgetting this ground reality, we have blamed each other for being unable to produce quality ME. No one is ready to take sole responsibility for ME's failure.

After exploring the colonial legacies in mathematics curriculum, pedagogy, and assessment, I have envisioned inclusive ME through the lens of a postcolonial perspective, critical theory, and emancipatory interest. In so doing, I have offered Zoe, Eco, and Techno visions of curriculum to connect mathematics with learners' lifeworlds by recognizing the plurality of onto-epistemic practices and the trans/inter/multidisciplinary embeddedness. Likewise, I have argued to enhance learners' spiritual consciousness through trans/inter/ multidisciplinary curricular

Figure 30

Mapping of Exiting and Envisioned Curricula

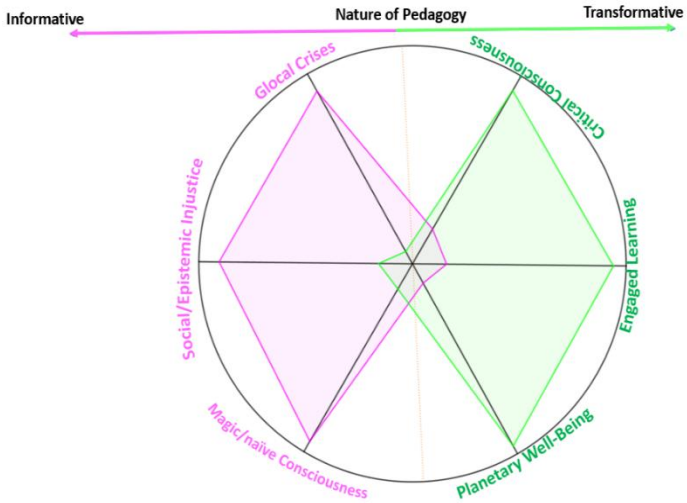


practices in ME that possibly foster a culture of mutual respect, interconnectedness, interdependence, and coexistence among human beings and the rest of the world. Moreover, I have proposed a transformative praxis-oriented curriculum to create an engaged learning environment in which learners become autonomous and responsible for their learning. It encourages learners to continuously engage in the learning process through action and reflection, enabling them to solve the non-routine real-world problems. Finally, a transformative praxis-oriented curriculum aims to produce conscious citizens who make informed decisions (Figure 30). In line with these features of the mathematics curriculum, I have envisioned a futuristic pedagogy.

I have proposed a pedagogical approach to create a learning environment where students can engage deeply in the learning process. An engaged learning environment supports connecting learners' heads, hearts, and hands by considering the cognitive, emotional, affective, physical, and spiritual aspects of mathematics learning. It emphasizes developing creative, critical, innovative, and imaginative thinking to enable learners to solve non-routine and real-world problems, rather than focusing on procedural, mechanistic learning that relies on memorization of mathematical facts, formulae, theorems, and lock-step algorithms.

Figure 31

Nature of Pedagogy



Likewise, to develop an agency in learners, I have envisioned pedagogy as/for fostering critical consciousness. It is because of accepting the fact that learning mathematics must enable learners to explore the implicit and explicit forces embedded in mathematics teaching and learning activities that adversely perpetuate various forms of injustice—onto-epistemic, social, economic, linguistic, and cultural.

Moreover, in light of the world's present crises, I have proposed a pedagogy for nurturing planetary well-being. The modern ME is backed by neoliberal sociopolitical economic policy that has irreparable effects on planetary earth. We need to be aware and prepare the future generation so that they become conscious and responsible

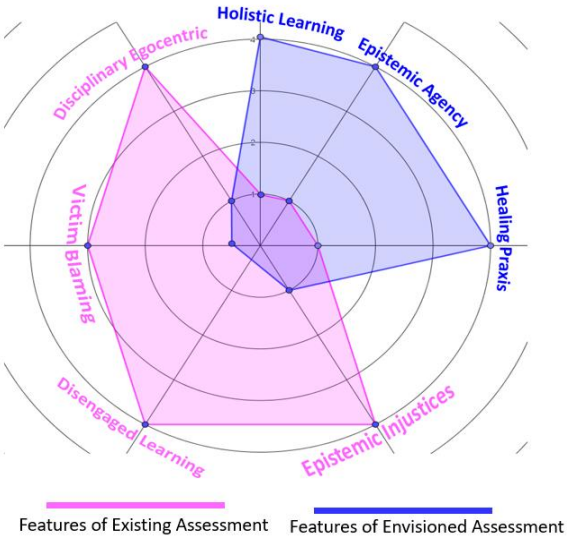
regarding the interconnectedness, interdependence, and coexistence of human beings and the rest of the natural world. It offers a space for learners to engage deeply as active agents in creating sustainable futures in which every life is possible (see Figure 31). To support the enhancement and implementation of the envisioned pedagogical approach in ME, I have also featured a transformative assessment system (Figure 32).

During my inquiry, I have revealed that the assessment system in ME suffers from colonial numerology through its reliance solely on high-stakes standardized tests and/or teacher-made paper-pencil tests that do not value students' emotions, feelings, convictions, sense of belonging, and onto-epistemic practices. It rarely recognizes the learners as epistemic agents. In this connection, I have envisioned assessments as means of enriching epistemic agency.

Epistemic agency indicates a learner's capability to create, connect with, and use mathematical knowledge across broader social, cultural, historical, and political terrains, enabling them to explore the disempowering forces behind the mainstream ME practice and actively engage in transforming it towards more inclusive and just ones. Likewise, I have offered a vision of assessment as/for enhancing holistic learning rather than being confined within the narrow premises of the classroom and school. It features learning as a process of becoming conscious citizens. The primary orientation of holistic learning is to teach children rather than to impart disciplinary knowledge (Bhansali, 2024). Finally, I have proposed an assessment for cultivating healing praxis. In my inquiry, I have revealed that the modern ME is plagued by competition, individualization, acquisition, economic rationality, scientific logic and consumerism that indoctrinate the Social Darwinism (Tobach, 1972, as cited in Stroud & Baines, 2019), ethic of extinction and intolerance (Bollier & Helfrich, 2020) that unfettered exploitation of GSTR countries and their people and natural resources for the benefit

Figure 32

Assessment System



of the colonial power centers that often perpetuate educational inequalities and do emotional and psychological harms to learners (Kokka, 2023).

In this context, healing praxis-informed assessment heals the students suffering from fear, anxiety, trauma, and onto-epistemic violence that have been instilled by the systemic structures of school and university to achieve mastery of externally imposed decontextualized and objective knowledge. Likewise, healing praxis-informed assessment practice enables learners to explore environmental devastation, ecological and biocultural losses, global warming, and the sixth extinction. It encourages them to resolve these issues to create sustainable futures. At this stage of inquiry, I believe the above-discussed features of curriculum, pedagogy, and assessment will help open a new discourse on ME practices in Nepal. I have captured these features of the envisioned postcolonial curriculum space in the following figure. (see Figure 33).

Alignment of My Inquiry to National Priority

The research issue of my PhD journey emerged from my lived experiences as an insider activist of ME in Nepal. From the very beginning of formal education to university-level education, I was taught that we (Nepali people) were and still are uneducated compared to Western people. It has unfavorably shaped the mindset of younger generations, and unevenly compels them to believe that the West is the best (Koirala, 2021). In this context, my inquiry has explored why our socio-cultural and historical knowledge and epistemic practices have not been recognized as worthy of inclusion in schooling.

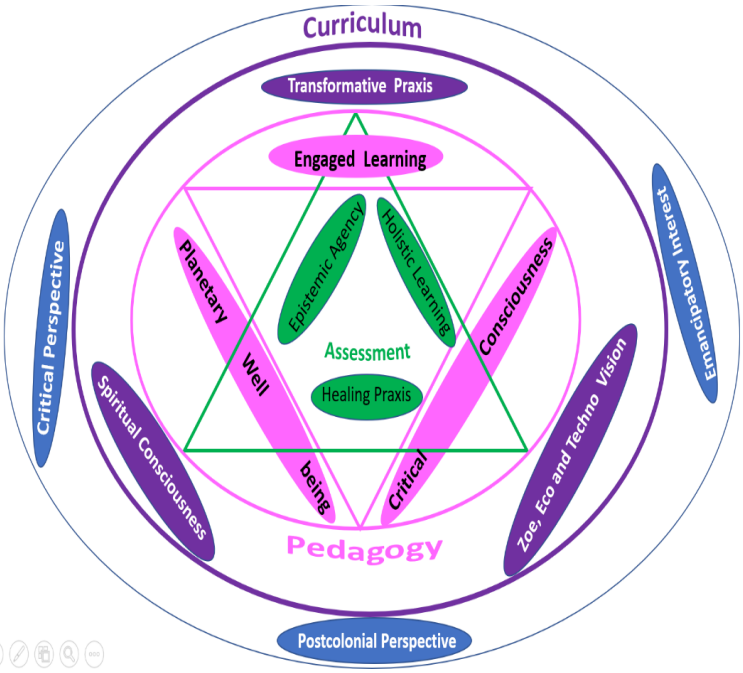
I have also explored how our local cosmological knowledge, skills, technologies, and ways of knowing, doing, and living are significant and contribute to eco-friendly, substantial living (Lamichhane & Luitel, 2023a, 2023b). During a process of inquiry, I have found that the curriculum practice has been governed by the winner-take-all approach in which social Darwinism becomes the social standard and norm that engulfs all other forms of knowledge, ways of knowing, doing, valuing, and living (Tobach, 1972, as cited in Stroud & Baines, 2019). Likewise, pedagogical practice in our school and university has not been oriented to ignite creative, critical, innovative, and imaginative thinking; instead, it focuses on enhancing the culture of reproducing the existing knowledge, skills, and concepts, developing false consciousness among the learners, thereby supporting the maintenance of the status

quo in educational institution, society and nation that urges learners to celebrate their own subjugation.

Moreover, the implementation of the unidimensional and disempowering high-stakes standardized and teacher-made paper pencil-tests in the name of accessing the learning outcomes of the learners implicitly helps to erode the higher order thinking ability and eventually assessment becomes a tool for social segregation and epistemic injustice that further supports to maintain unhealthy social hierarchy, status quo and ideological supremacy of the West that cast the shadow on the inclusiveness and deep democratic practices which are some of the significant educational priority of our education system (CDC, 2019).

Figure 33

Postcolonial Curriculum Space



The features of inclusiveness, deep democracy, and planetary well-being cannot be achieved without recognizing the nation's sociocultural and historical heritage, as well as local cosmological and/or indigenous knowledge, skills, and technologies. My inquiry opens new discourse on these issues from postcolonial perspectives, helping transform the existing unidimensional, disciplinary, egocentric thought towards more empowering and authentic ones. It offers a curriculum space as a transformative praxis, incorporates the zoe, eco, and techno visions, and spiritual consciousness that enable learners to be conscious citizens so that they can contribute to the well-being of the planetary earth. This curriculum space indeed underpins transforming the conventional ME by breaking the colonial loop—condemnation, brainwashing, and conditioning (van Stam, 2017). It also disrupts the grounds for advocating the supremacy of the neoliberal sociopolitical economy that supports

perpetuating the various forms of inequalities, including onto-epistemic injustice (Ball & Collet-Sabé, 2025; Santos, 2016), cultural hegemony (Gramsci,1971), and singular ideology (Lamichhane & Luitel, 2023a; Luitel, 2009). In this scenario, my inquiry contributes to framing an inclusive mathematics curriculum that celebrates the plurality of knowing, doing, and living and interconnectedness, interdependences, and coexistence of human beings with the rest of nature that underpins enhancing planetary well-being for a sustainable future, which is a primary priority area of contemporary education, not only in Nepal but also throughout the world.

Moreover, my inquiry has addressed pedagogical and assessment issues in ME, which are among the most debated and critically examined areas of the field. I have revealed the disempowering notion of pedagogy and assessment systems in ME. The existing informative and confirmatory pedagogy seemed to focus on developing a magic/naïve consciousness among practitioners, making them unconscious and uncritical spectators of social injustice and onto-epistemic injustice, and giving consent to their subjugation and suppression, thereby concealing the glocal crisis. To resolve these issues, I have envisioned an authentic and empowering pedagogy that fosters an engaged learning environment, develop critical consciousness, and nurture planetary well-being.

Likewise, I have explored the disempowering nature of assessment of learning, which instigates a victim-blaming culture, demolishes an engaged learning culture, reinforces disciplinary egocentrism, and epistemic injustice as being in the grip of colonial numerology. To overcome this oppressive assessment system, I have proposed a transformative assessment framework to enrich epistemic agency, enhance holistic learning, and cultivate healing praxis. The transformative assessment system not only focuses on developing creative, critical, imaginative, and innovative thinking and doing in mathematics but also supports the learners to critique ideological oppression, recognize otherwise neglected voices, identities, and values, develop a culture of mutual respect, and acknowledge the interdependence, interconnectedness, and coexistence of human beings and rest of the world and appeals for working toward for planetary well-being. When people find recognition and valuation of their cultures, histories, identities, and ways of knowing, doing, and living, they enjoy the beauty of inclusivity, mutual respect, collaboration and coexistence with nature and other creatures that possibly give new vibes in their lives, thereby, creating the conception of

solidarity for national unity which would contribute to the nation building process and sustainable future as well that are the major national priority of the country.

Final Remarks and Way Forward

Research issues in my PhD journey have evolved from my lived experiences. I have experienced various forms of domination and suppression from the very beginning of my formal schooling to university level education (see Chapter I). I was bemused by why our ME always remains far removed from our social, cultural, and historical context. And do we have our own mathematical history? Likewise, are our ancestors really illiterate, uncultured, and uncivilized? These disempowering features of education in general and ME in particular always prompt me to ask why such a situation has occurred, whose knowledge is recognized, who is responsible, and many more questions. In this context, this postcolonial inquiry aims to explore the perpetuation of colonialism across a broad spectrum of ME in Nepal and to offer an inclusive ME.

In this inquiry, I have revealed that ME rarely connects with learners' lifeworlds and ignores their epistemic agency by creating a false narrative of mathematics as asocial, apolitical, acultural, and value-neutral in our context. It was further exacerbated by disempowering pedagogy and by the justification and validation of learning through a colonial numerological approach. Moreover, a non-responsive, isolated, and colonial postures of research pervasive in ME that are also testaments in my own and collaborative writing and publications (e.g., Lamichhane, 2020, 2022, 2024; Lamichhane & Luitel, 2023a, 2023b) unearth the colonial entanglement in ME under the guise of modernism, scientism, and economic rationality of neoliberal sociopolitical economic policy.

Moreover, my inquiry revealed that the objective and value-neutral stands of the Western-Eurocentric view of mathematics, neoliberal sociopolitical economic policy, and economic rationality that promote competition, individualization, acquisition, corporatization, and materialistic development engulf collaborative practices, societal and collective well-being, empathic vision, and spiritual consciousness, thereby fostering a ground for systemic structural oppression and domination. From my inquiry, I have found that colonial influence is deeply embedded in curricula, pedagogy, and assessment across the school-to-university continuum, as briefly summarized below.

1. A highly centralized, bureaucratic approach to curriculum development adopted in ME ignores the social, cultural, and historical milieu, rendering the curriculum a journey through a dark tunnel.
2. Curricula celebrate an exclusive view of reality under the guise of modernism, scientism, and economic rationality of neoliberal economic policy, most of which are backed by Western Eurocentric thought.
3. Curricula promote epistemicide by disqualifying social, historical, and cultural agents, destroying other forms of knowledge and ways of knowing, and forcibly compelling assimilation into the othered culture.
4. Curricula blame other people as illiterate, uncultured, and uncivilized, devalue their lingual practices, and enhance the consumerist ethos to perpetuate the colonial ideology.
5. In line with the above features of the curriculum, an informative pedagogy has been endorsed in ME that fails to explore social and epistemic injustices, restrains students within a magic/naïve consciousness, and supports the concealment of glocal crises.
6. Assessment of learning promotes a colonial numerological approach to assess the learning outcomes. It becomes a powerful tool to justify and validate epistemic injustice, disciplinary egocentrism, foster a disengaged learning environment, and develop a victim-blaming culture.

To address the above disempowering features of curriculum, pedagogy and assessment system in ME, which are implicitly and explicitly backed by colonial power center, I have envisioned ME emphasizing context based trans/multi/interdisciplinary curriculum, acknowledging divers learning approaches for ensuring equitable participations and accessing the learning outcomes of the learners for promoting the holistic learning approach by means of developing the epistemic agency so that learners can contribute to healing the wounded humanities and become enthusiastic to revive planetary health for sustainable future. The significant features of the envisioned ME are summarized below.

1. Curriculum practices do not restrict the learners within the particular disciplinary boundary; they need to embrace the zoe, eco, and techno vision for enhancing the trans/multi/ interdisciplinary praxis so that learners become conscious about interdependence, interconnectedness, and coexistence of

human beings and the rest of the world, and are willing to resolve the present crises by using advanced technological tools and strategies.

2. The curriculum fosters spiritual consciousness by incorporating an empathetic vision, a culture of mutual respect, collaborative and cooperative action and reflection, and an appreciation for all life on earth and non-living objects as inseparable entities, to create a culture of peace and a sustainable future.
3. The curriculum nurtures transformative praxis in which learners continuously engage in a dialectical interplay between action and reflection to bridge the gap between theory and practice.
4. To foster the attributes of the envisioned curriculum, mathematics pedagogy needs to create an engaged learning environment in which students can relate mathematics to their immediate environment.
5. Mathematics pedagogy enhances critical consciousness so that learners can raise questions, explore the oppressive forces entrenched in institutions, society, and the nation that perpetuate various forms of inequality and domination, and actively engage to resolve these issues.
6. Mathematics pedagogy needs to explore the interdependence, interconnectedness, and coexistence of human beings with the rest of the world, so that learners become enthusiastic about acting for planetary well-being and creating a sustainable future.
7. To develop and enhance the above features and attributes of curriculum and pedagogy, the assessment system creates a holistic learning environment in which learners can engage in learning by employing their epistemic agency.
8. Assessment does not become a tool for segregating society, marginalizing the majority of learners, and ignoring their scholarships. It nurtures healing praxis that helps learners engage in the learning process, irrespective of their backgrounds, sense of belonging, scholarships, and support for healing the wounded humanities and the planetary crisis.

At this stage, I have realized that my inquiry contributes to a transformative vision of ME by incorporating a trans/multi/interdisciplinary curriculum that aims to prepare creative, critical, imaginative, authentic, and responsive citizens (learners) so that they can explore and challenge oppressive forces embedded in ME, society, and nation, and actively engage to transform it towards more inclusive and empowering ones.

Further, my inquiry appeals to mathematics teachers, educators, curriculum designers, assessment developers, and other stakeholders to critically look into their practices for enrichment of their academic, professional, social, and cultural knowledge and skills because it draws upon the ongoing discourse of postcolonial mathematics that not only emphasizes autonomy and responsibility but also sparks meaningful relationships of human beings and the rest of the planetary earth. In doing so, my inquiry highlights the philosophical, curricular, and pedagogical significance, as well as the significance for assessment, through meaningful dialogue. However, many areas remain unexplored. It opens up further opportunities to continue my journey in postcolonial ME in the context of Nepal, an underexplored area of research.

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APPENDICES

Appendix I

Ranjana Numeral System

(Acharya, 2017a, p. 223)

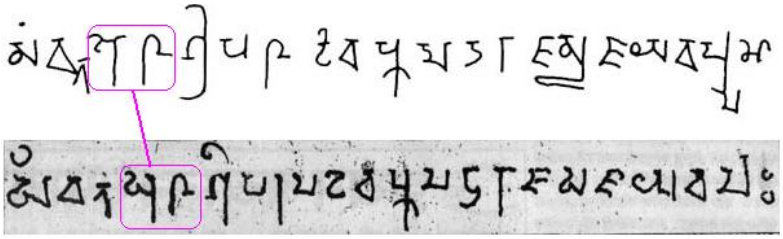
Appendix II

Lichavian Numeral System

1	2	3	4	5	6	7	8	9
10	20	30	40	50	60	70	80	90
100	200	300	400	500	600	700	800	900

Inscription on the pedestal of the Jaya Varma-sculpture

Maligaon, Kathmandu, Nepal,

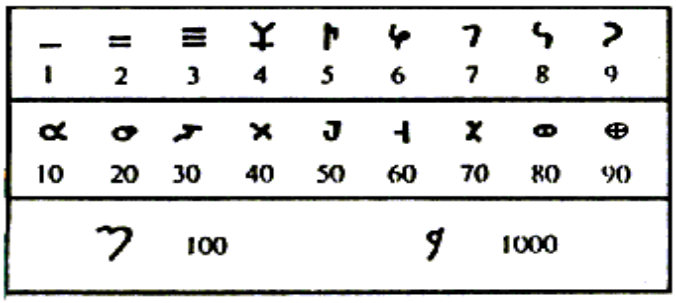


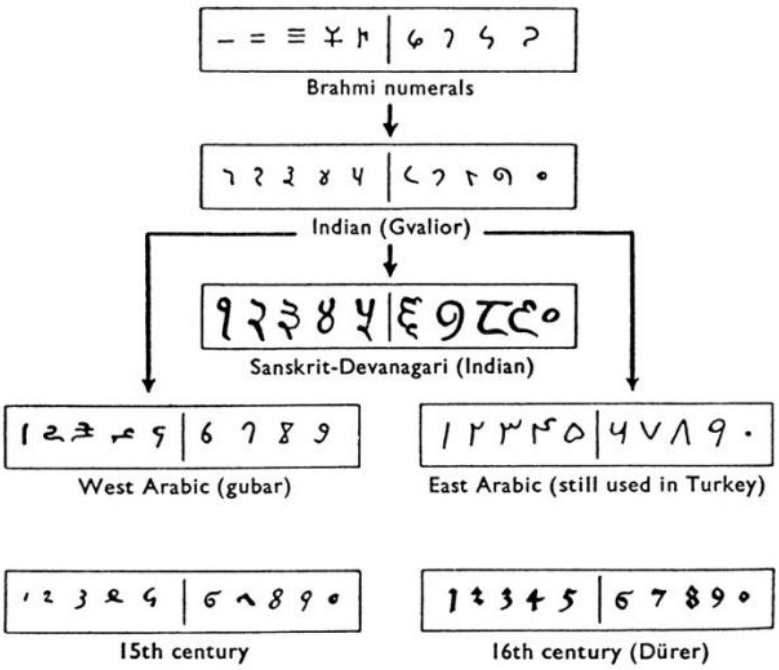
Reading of the inscription by Hemraj Sakya, Kathmandu Nepal

(Shrestha, 2008, pp 70-72).

Appendix III

Brahmi Numeral System





(Acharya, 2018, p. 138; Shrestha, 2008, p. 69)