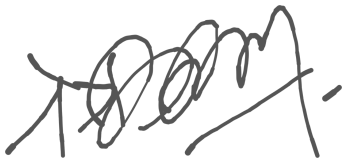
CONNECTING ACADEMIC AND NON-ACADEMIC LIFEWORLDS FOR ENVISIONING A TRANSFORMATIVE STEAM EDUCATION IN NEPAL: AN EVOCATIVE AUTOETHNOGRAPHIC INQUIRY



Netra Kumar Manandhar

A Dissertation

Submitted to

School of Education

in Partial Fulfillment of the Requirements for the Degree of

Master of Philosophy in STEAM Education

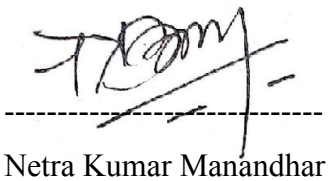
Kathmandu University

Dhulikhel, Nepal

February 2021

DECLARATION

I hereby declare that this dissertation has not been submitted earlier for the candidate for any other degree.



---------- February 16, 2021

Netra Kumar Manandhar
Degree Candidate

DEDICATION

This dissertation is dedicated:

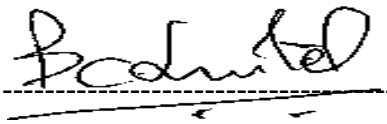
To my parents Indra Bahadur Manandhar and Indra Maya Manandhar who always stood by my side for my education and left no stone unturned in the entire academic endeavor.

To my beloved siblings (My brothers Bed Kumar Manandhar, Padam Kumar Manandhar, Keshar Manandhar, and sister Laxmi Manandhar) and relatives for their continuous encouragement and supports.

To all the known and unknown teachers who taught me to stand and inspire me to move ahead along this educational journey.

Master of Philosophy in STEAM Education dissertation of Netra Kumar Manandhar entitled *"Connecting Academic and Non-academic Lifeworlds for Envisioning a Transformative STEAM Education in Nepal: An Evocative Autoethnographic Inquiry"* presented on February 16, 2021.

APPROVED



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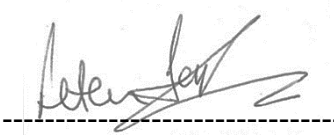

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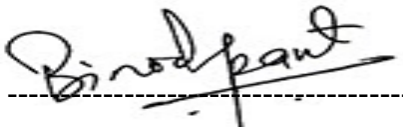

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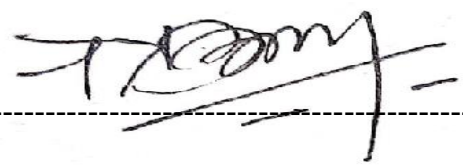
Asst. Prof. Binod Prasad Pant
Acting Head, Department of STEAM Education

---------- February 16, 2021

Prof. Mahesh Nath Parajuli, PhD
Dean/Chair of Research Committee

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



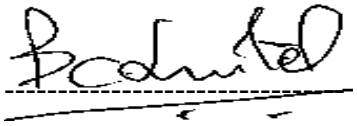
---------- February 16, 2021

Netra Kumar Manandhar, Degree Candidate

ABSTRACT

An abstract of the dissertation of Netra Kumar Manandhar for the degree of Master of Philosophy in STEAM Education presented at Kathmandu University School of Education on February 16, 2021.

Title: *Connecting Academic and Non-academic Lifeworlds for Envisioning a Transformative STEAM Education in Nepal: An Evocative Autoethnographic Inquiry*

Abstract Approved: 

Prof. Bal Chandra Luitel, PhD

Dissertation Supervisor

From the early years of schooling, I experienced a separation of my non-academic lifeworlds (contexts of brick factories, Newari culture, arts-related activities, restaurants, and the entrepreneurial world) from formal educational practices (curriculum, pedagogy, and assessment) – a dualism that academic world exists outside the non-academic world of a learner. Pedagogical approaches implemented by my teachers and textbooks prepared by so-called experts did not seem to be aware of my diverse cultures, contexts, and abilities. From school to under graduation, it seemed that I was under the domination of the highly teacher-centered and one-size-fits-all nature of education. As a teacher, I also followed the footsteps of traditional/conventional perspectives. However, there appear to be diverse opportunities in my non-academic worlds to support my all-round development. During my MEd in mathematics education and MPhil in STEAM education, I had enough space to critically reflect upon my and others' beliefs, values, assumptions, and ongoing educational practices governed by those un/helpful ideologies. Similarly, I happened to develop knowledge/skills regarding the better alternatives of education possibly governed by constructivist and

transformative philosophies. In this regard, I see the integrative context of education that might be helpful to blend learner's lifeworlds and formal education thereby promoting the holistic notion of education. Thus, this autoethnographic inquiry aimed at capturing my painful and gainful lived experiences of my non/academic lifeworlds to bridge them to envision a transformative vision of STEAM education. To address some of the emerging issues of education, I constructed four research questions to cover this entire inquiry.

Under the multi-paradigmatic research design space, I employed three research paradigms: criticalism, postmodernism, and interpretivism to carry out this inquiry successfully. Similarly, I used evocative autoethnography as a methodology and writing narratives as a method of inquiry. In this entire inquiry process, I was mostly guided by, but limited to, three grand theories as referents: Living Educational Theory, Transformative Learning Theory, and Knowledge Constitutive Interests. Moreover, I used crucial concepts such as Holistic Education, Research as Transformative Learning, and Research as Envisioning as referents in this inquiry.

I divided this inquiry mainly into four parts. I developed the first part to address the first research question. The aim was to portray my lived experiences from my schooling to under graduation in mathematics education. By critically reflecting upon every perspective I presented, I tried to capture the conventionality or traditional contexts of education in the context of Nepal which might be an unhelpful model of education. I tried to articulate the one-size-fits-all nature of educationally disempowering practices and how they could lead to emerging problems such as disengagement, disinterest, lack of real-world applications of knowledge/skills, injustice in education and society. On the other hand, I explored some of the alternatives to those practices such as assessment as/for learning, constructivist and progressive pedagogies (e.g., inquiry-based learning), etc. which might be helpful to solve some of the pressing issues in education.

I developed the second part of this inquiry to address the second research question to capture my non-academic pursuits which could be effective assets for an education system governed by the holistic notion of education. Presenting my personal narratives and dialogues, I tried to advocate for culturally contextualized educational perspectives, arts-based learning as living pedagogy, ICTs as tools for innovation and empowerment, and entrepreneurial learning as a pedagogy for turning ideas into actions for economic sustainability. Moreover, this part greatly emphasized on blending or connecting students' lifeworlds through empowering teaching and learning methodologies to promote the holistic development of a learner.

The third part was developed to capture my lived experiences during my MEd in mathematics education and MPhil in STEAM education. The central aim of this part was to discuss my transformative shifts in my thoughts and actions regarding my personal and professional practices. I presented narratives, dialogues, and stories to depict my moves towards embracing practices governed by constructivist and transformative sensibilities. In doing so, I envisaged the possibility for a drastic change in education through the ethical implementation of technology-blended pedagogy, culturally responsive pedagogy (ethnomathematics, fund of knowledge, etc.), arts-integrated pedagogy, STEAM as a pedagogical approach, and transformative images of the curriculum (curriculum as experience, as currere, and as social reconstruction, etc.). These could be vital to prepare students with meaningful experiences and 21st-century skills wherein a student is anticipated to be capable of being a creator, developer, critical thinker, and problem solver.

The final part of this inquiry aimed to respond to my fourth research question by portraying my vision of transformative STEAM education. I have developed my vision through semi-fictive creative imagination towards implementing the integrated nature of education. Under the interdisciplinary and transdisciplinary integrated curriculum, I

developed my vision of STEAM education by portraying the future attributes of assessment, school, teacher, and student. This probably was my vision to balance the traditional and modern vision of education thereby seeking a better alternative to make this world a better place through education.

In the midst of accomplishing this evocative autoethnographic endeavor, however, this is yet not the conclusion, I found myself a more autonomous and responsible citizen and/or professional who always seeks/works for empowering and inclusive changes in people and ultimately in society. Inculcating the transformative sensibilities by developing higher abilities, I found myself being and becoming an agent of change in my personal and professional contexts. Hence, this research journey has been one of the meaningful life achievements for me. Additionally, for others, this might be a turning point to join this transformative journey.

ACKNOWLEDGEMENTS

I would like to wholeheartedly express my profound gratitude to my dissertation supervisor Prof. Bal Chandra Luitel, PhD for his continuous inspiration, motivation, care, and support throughout this inquiry. His constructive and prompt feedback through face-to-face and online meetings and discussions became humongous support and encouragement for me to bring this dissertation to this stage. I deeply appreciate his critical and thought-provoking ideas and responses to my queries that helped me germinate new thoughts and ideas every time.

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My genuine respect goes to Asst. Prof. Binod Prasad Pant, Acting Head of the Department of STEAM education, for his inspiration, motivation, and support from the beginning of my University journey at Kathmandu University and during the time of writing this inquiry, without him this scholarly journey would not have been as expected.

I am thankful to the department of STEAM Education, Kathmandu University School of Education for providing me with a homely environment to work and conduct this research inquiry.

I am, from the bottom of my heart, thankful to all my gurus at Kathmandu University School of Education: Respected Dean Prof. Mahesh Nath Parajuli, PhD, Assoc. Dean Prof. Laxman Gnawali, PhD, Assoc. Prof. Prakash Chandra Bhattarai, PhD, Assoc. Prof. Dhanapati Subedi, Asst. Prof. Suresh Gautam, PhD, Asst. Prof. Shesha Kanta Pangeni, PhD, Indra Mani Rai, PhD, who directly or indirectly provided constructive feedback as well as encouragement during my MPhil journey and this research inquiry.

I would like to shower my deepest appreciation and love to my respected facilitator and lecturer Mr. Indra Mani Shrestha and visiting faculty/research assistant Niroj Dahal for their continuous encouragement, tremendous guidance, valuable suggestions, creative but critical feedback on my work since the beginning of joining KUSOED.

I extend my thanks to KUSOED family: Mr. Raju Maharjan, Mr. Dil Kumar Shrestha, and Mr. Ganesh Khatiwada for their supports in my need during my journey at KUSOED.

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Finally, I am very thankful to all known and unknown people for their in/direct support to learn something new and evolve myself to tackle challenges in this complex world.

Netra Kumar Manandhar, Degree Candidate

ABBREVIATIONS

10+2	2 years intermediate education (Grades 11 and 12)
APA	American Psychological Association
BEd	Bachelor's in Education
CDC	Curriculum Development Center
ICT	Information and Communication Technology
KU	Kathmandu University
KUSOED	Kathmandu University School of Education
MEd	Master's in Education
MPhil	Master of Philosophy
PhD	Doctor of Philosophy
SEE	Secondary Education Examination
SLC	School Leaving Certificate
STEAM	Science, Technology, Engineering, Arts, and Mathematics
STEM	Science, Technology, Engineering, and Mathematics
UNESCO	United Nations Educational, Scientific and Cultural Organization

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ORIENTATION TO THE READERS

While reading this dissertation, there are some crucial aspects considered about it by every reader. Therefore, I would like to discuss them in the following sub-headings.

About the Dissertation

This dissertation presents my lived experiences of academic and non-academic worlds by connecting to issues arising from a wider academic context. I unfolded my hidden stories representing the cultural, socio-economic, and educational contexts through this research inquiry. The main aim was to bridge these two seemingly separate worlds to develop a vision of transformative STEAM education in the context of Nepal. So, the dissertation consists of my lived stories from my academic journey, non-academic lifeworlds, a transformative shift in my actions and thoughts, and finally my vision of making transformative STEAM education for empowering educational practices in Nepal.

Inquiry as well as Research

I would like to call this dissertation a mixture of inquiry and research. But I stressed more on the inquiry process to search for the meanings. Through introspection and retrospection, I tried to generate meanings through narratives. So, I want readers to delve into the self-examination process to understand the deeper meaning portrayed throughout this dissertation.

Analysis

Throughout this dissertation, I preferred to be less analytical but more meaning-maker and meaning-seeker. I tried to delve deeper into the process of meaning un/making. So, I request you (readers) to take this dissertation as a process of making meanings rather than analysis of the data.

No Data or Data as Writing

As an autoethnographer, I did not depend upon the normative form of 'data' which holds a bit quantitative attribute. Rather I unfolded my experiences and presented them by developing the emergent questions of this inquiry. In this context, the questions of this inquiry were also generated one after another ('Emergent'). So, I use data as writing.

Findings

There are no findings as such in this dissertation. However, the generated meanings and perspectives are the insights I developed through the combination of narratives (my own lived experiences) and theories and concepts. So, I request readers not to judge the insights evolved as culminating products or findings.

Figures

Throughout this dissertation, I have used the non-linguistic genre by inserting figures, images, models, etc. There are two types of figures I used in this inquiry: context-based figures and metaphor-based figures. To differentiate them, I have given the figure number and very short descriptions to the context-based figures. However, I have kept metaphor-based figures without mentioning their figure numbers and illustrating descriptions.

CHAPTER I

LOCATING MYSELF IN THE FIELD OF MY RESEARCH

I am feeling pleased at this moment because I am unfolding my lived stories to explore the wider social, cultural, and educational phenomena that I experienced through this inquiry to communicate with the world. The major sources of these stories are the two seemingly separate worlds: Academic and Non-academic. In the beginning, I was unsure about making my experiences public because I was unaware of the potential value of those stories in wider academia. After exploring an immense connection of my lived experiences with the emerging and ongoing issues related to education and human life, I commenced this journey of research. This is an endeavor for me to reveal my hidden stories in this academically rich inquiry. Moreover, I am becoming ambitious and critically conscious while portraying my dreams and vision(s) towards developing a transformative education via this inquiry that might enable every one of us to make this world a better place by embracing the empowering social and/or educational practices. In doing so, I am becoming emotional in presenting my painful and gainful experiences. I would like to welcome every one of you on this journey.

This is the first chapter of my research inquiry. This chapter includes the general background or introduction to this inquiry in which I discuss the ideas, thoughts, and perspectives evolved from my experiences in academic and non-academic lifeworlds. The chapter especially captures the birth of my research including some of the pressing issues in education in general and mathematics education in particular, the arising statements of the problems, the purpose of this inquiry and the emerging research questions, the significance of

this research inquiry for me and others, and finally the theoretical lenses and some crucial concepts that I am planning to use as referents in conducting this inquiry.

The Birth of My Research

Being a member of an economically underprivileged family, my journey with my academic and non-academic lifeworlds was not so easy. I can say that my life is a part of a fairy tale filled with devastating instances, struggles, adversities, hopes, and some academically successful stories (in terms of what I have achieved till now). I accept that there are people who have been living their life with full of sorrows and sufferings. I know that their pains might be much more than mine. However, I believe that I have gone through similar situations. Because of economic vulnerabilities, I struggled abundantly to fulfill the very basic human needs or to fulfill the lower levels (physiological and safety needs) according to Maslow's hierarchy of needs. It was extremely difficult for me to meet the lower levels which are considered to be fundamental for one's well-being, and if those are not fulfilled, the higher levels such as belonging, esteem, self-actualization, and self-transcendence (not sequential, however) will not be easily met (Fadel et al., 2015). That is why the *'fairy tale'* metaphor seems to be conducive here.

I have divided this journey into two worlds: Academic and Non-academic. They seem to be separated as far as the present and conventional education system is concerned. In this inquiry, I frequently use these two words to represent my two worlds. I assume that most of us might have been familiar with the academic world – the similar learning journey we traveled. Here, my immense emphasis is on my non-academic world in which I spent half of my life (till this time of writing this inquiry) to economically survive and fulfill my educational desires. This world has taught me to fight for my empty stomach and to fulfill my dream to be a great person in society and the field of education. In the tremendous impediments, I had/have been learning to stand; dreaming for creating a better future; and

eventually working so hard more than yesterday to give something back to my family, my society or my country, and the world. This perhaps visualizes that I was conscious and responsible towards my actions because I always tried to do something good in my life. This might be true that the challenges I faced in life always taught/encouraged me to come out of those economic hurdles and improve the ways of our living.

When I came into this world, my parents had two major professions to survive. Every year, they used to go to a kiln or brick factory to produce raw bricks for about six months (*Mangsir*[1] *– Baishakh*[2]). In the next very six months (*Jeshtha*[3] *– Kartik*[4]), they used to work in the village (located in Ramechhap district, province no. 3 (Bagmati), the north-eastern part of Nepal), in our home and others homes. It was clear that brick factories were only the sources of our income to survive in this world. For sure, I had to be a part of this journey for the next 18 years. Since my birth, I was habituated with these two worlds: brick factories, and home in the village. This way, I started my journey as a victim of child labor. I wholeheartedly thank my parents for understanding the values of education in human life though they were not so much educated. My father had completed grade seven, but the mother was illiterate. However, they stood tall

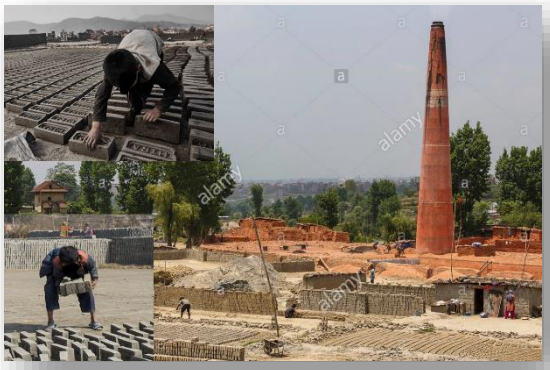


Figure 1. Picture of child labor and brick factory

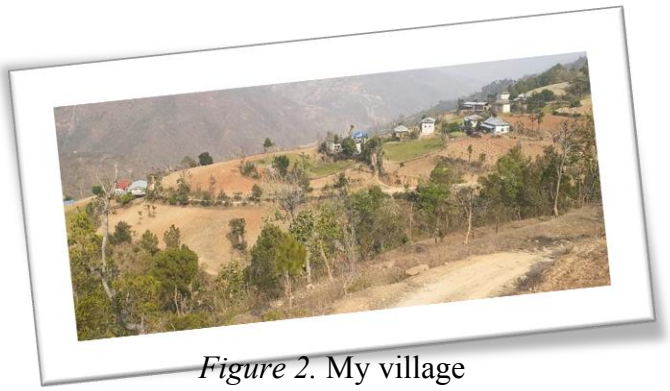


Figure 2. My village

[1] Eighth month of the year according to Nepali calendar
[2] First month of the year according to Nepali calendar
[3] Second month of the year according to Nepali calendar
[4] Seventh month of the year according to Nepali calendar

and left no stone unturned to continue my education though I worked with them in those brick factories. In the next six months (Jeshtha – Kartik) during my parents' stay in the village, I used to go to school to continue my education. The continuation of education was another massive challenge for me. *How could I do this by attending school only for six months? Was it easy for me to pass every grade?* In brick factories, there were/are no facilities for attending schools as these were/are for earning purposes and children who attend/ed school only for six months seems to be impossible to pass the examination. For child labor, *how could it be possible to continue both works in the brick factories and education in school? What about child rights?* This seems to be difficult to carry out for most of us. Fortunately, I was not only able to continue my academic journey but also to get tremendous successes in it. I always achieved the top position in every grade of school education. This might be one of the reasons that encouraged me to get more success in my academic world.

Before I was enrolled in a school, I was surrounded by the environment of brick kilns where I learned several mathematical ideas by interacting with the materials and contexts of those brick factories. Those mathematically rich brick factories perhaps shaped my preliminary education. I learned counting numbers एक (one), दुइ (two), तिन (three), ….., till एक सय (one hundred) and more whilst flipping the bricks, while counting the rows and columns of bricks and piles of bricks, and while producing bricks, etc. I learned some basic mathematical operations such as addition, subtraction, division, and multiplication at that time during the brick-making procedure. Meanwhile, I interacted with concrete materials, contexts, and environment to learn basic mathematical ideas with the help of my father and others. Before my schooling, I got an ample opportunity to interact with numerous geometrically rich objects such as bricks, brick-making tools, houses, chimneys, etc. in those brick factories. More so, this world was also rich in developing other mathematical ideas such

as mensuration (home arithmetic), tessellation, symmetry, functions, etc. Besides mathematics, I could also develop some knowledge/skills of other subjects and disciplines including some fundamental human values, ethics, and attitudes based on the socio-cultural contexts. Nonetheless, doing labor as a child in those brick factories during the winter and spring seasons was unpredictably painful. Working with clay from early morning around at 4 am to the evening about at 8 pm (about 16 hours) in those cold seasons was/is throbbing for everyone. However, I had no other options except supporting my parents to earn so that we could at least survive.

When I was six years old, we lost almost all our land and properties due to some legal cause. This catastrophic situation made us migrate to another village in the same district which was nearby my maternal home. In the same year, unfortunately, we lost our newly made home due to heavy rainfall and landslide. Oh god, *how could you give injustice to us? Are/were we the only people you wanted to put in pains and sufferings?* Nevertheless, I am grateful to all mighty Gods and Goddesses because we were still saved despite such pains and economical adversities. In this devastating situation, my parents dared to start my education in a nearby school, from where I completed my primary level education.

In this complicated situation, I dared to complete my school education. I completed SLC[5] by experiencing both worlds as discussed above. Arriving here, I am pondering: *how did I manage to complete my school education with the best marks in the final assessments and got top*

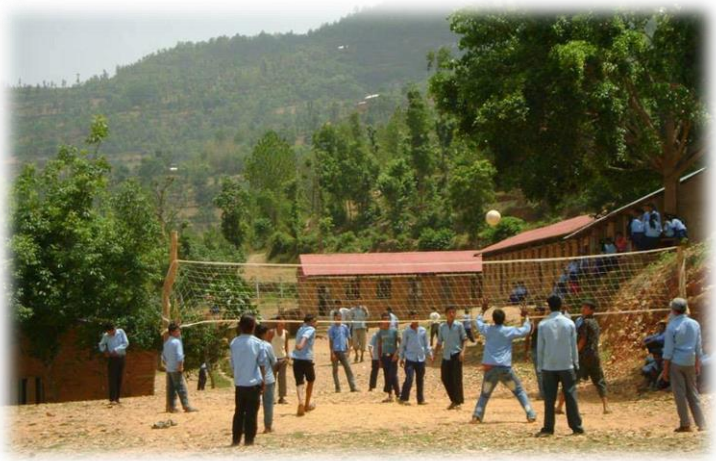


Figure 3. My school from where I completed my school education

[5] School Leaving Certificate, now SEE (Secondary Education Examination)

positions in such a critical situation? This educational journey was extremely difficult for me besides my involvement in brick factories. The academic journey was another huge challenge for me to tackle because of the ongoing educational practices. There are both good and bad memories of my school days. There are a few good memories such as I had friends to play with and share several things, I had very few opportunities to involve in extracurricular activities (especially playing local and other games on the school playgrounds), chanting poems and songs collaboratively, etc. On the contrary to this, the challenging job was to learn or to get an education.

Since earlier grades of schooling, my academic journey mostly followed memorization, rote recall, algorithmic problem-solving, and reproduction of the facts, information, rules, theorems, and many more kept in textbooks, guidebooks, and prescriptions given by teachers. I considered them as the ultimate sources of knowledge. In each grade, the nature of the teaching and learning process seemed to be so linear (Luitel, 2009; Shrestha, 2018). With the continuation of the new grade level, I was able to internalize what I should or should not do as a student to get the final achievement. I developed a notion of the student as an obedient and a reproducer of knowledge confining himself/herself largely within the teacher-centered and paper-pencil-driven model of education. Being influenced by this notion, I mastered the memorization skills and algorithmic problem-solving skills or logical and analytical thinking skills. The compulsion of going to brick factories enforced me even more in such skills because they were only the options left with me to get good marks in the final examination or pass the examination – a kind of battle for me. In the brick factories, I had to continue the similar approach day and night without getting other's support except going through the guidebooks and textbooks. In this tradition of 'घोकन्ते विद्या' (literally: recalling education), I tried to establish myself as a good student with the love and support of my teachers as well as parents and relatives.

When I first interacted with the word 'मेरो गणित' or My Mathematics in primary level, mathematics as a textbook was the notion I had developed. The learning procedures promoted my understanding of mathematics as a separate, major, and difficult subject to study. Celebrating the major role of analytical thinking in learning, I could perceive mathematics and other subjects as a collection of universally accepted truths and as a body of pure knowledge rather than as an impure or the balance of both im/pure, culturally, and contextually situated knowledge or discipline (Luitel, 2013). My school education seemed to insist students like me for accepting that mathematics is something that is made or discovered by some great and container-sized minds, brilliant scientists or mathematicians or genius, or people from the other planets of the galaxy. As I remember at this point of inquiry, I have realized that I was presented with textbooks, practice books, and guidebooks filled with rote problems including their predefined solutions and answers, and theorems to be proved by the standard 'Godly Given' some fixed, unchangeable, and unbreakable structures or methods with the bureaucratic language. In such a tradition of overlooking the learner and the context, *how could I connect academic contents and my lifeworlds in those brick factories?*

The practices seemed to be powerful to celebrate the principles of behavioristic and a few of cognitivist theories of learning which possibly led teachers to promote decontextualized nature of curriculum by assuming students as objects separated from the external environment, culture, and context. As I reflect on my schooling from 1998 to 2009, I find no such teachers who presented themselves with concrete materials and rich context while teaching except some mathematics teachers who used to bring geometry box to teach the basics of geometry. I did not experience the classroom contexts wherein teachers used constructivist methods such as collaborative group works, inquiry-based approaches (students used to be remained silent for asking out of context questions), project-based learning, etc. However, the 'chalk and talk' or lecture method would be the all-time favorite of teachers by

following the principles of reductionism (Luitel, 2009; Pant, 2015) to emphasize on lower order thinking skills. On top of this, I could internalize the teachers' future-oriented sacred statements such as *this is useful for your future; mathematics and science secure your future, they are difficult, the people who are good at math and science earn more than anyone; and you need to follow the rules to be a good human being in the future*, among others. This seems to be similar to what Freire (1993) called a banking model of education. Freire's magnum-opus, 'Pedagogy of the Oppressed' had/has become the voice of those, in education, who are oppressed academically. This has raised critical awareness against unjust pedagogical practices. As per this perspective, pedagogy seems to be a process of depositing the knowledge into students' minds so that it can be used in the future as money just as deposited in the bank can be withdrawn in the future for several economic purposes.

Following such learning practice, I might have been able to score good marks and collect certificates but *are they sufficient for me to survive in this world?* The painful journey of 'memorization as godly given approach' and 'practice makes a man perfect' could have been helpful to some extent at a point in time *but how about the practical application of those knowledge/skills in the past, at present, and in the future? Could I apply those knowledge/skills in my real-world context, at least to minimize my economic challenges?* Arriving at this stage, I have realized that I could not relate my academic contents and contexts to my lifeworld in brick factories. As mentioned earlier, the contexts of brick factories might have eased my learning thereby developing meaningful learning experiences, but it appears to be that the formal education system was far away from my reality. Nevertheless, assuming that every cloud has a silver lining, I always waited for a better future as shown by my teachers. Reflecting on such context of one-size-fits-all nature of education, school education can be blamed for killing essential 21st-century skills of students thereby increasing disengagement in learning and emotional health issues such as hopelessness,

anxiety, depression, and despair (Wagley, 2016). All of us might have even heard that many students commit suicide because of the high-stake examination system and results.

After completion of SLC, I spend the next six months in a hotel as a waiter. At that moment, I experienced another world and developed some knowledge, skills, values, and attitudes which might have been assets for me to live in this complex world. I accumulated another set of skills from this field. My economically unstable and weak life was dragging me and forcing me to complete my 10+2 in mathematics education because I could not join the science faculty which was considered (still people consider) as an expensive and prestigious faculty to be a doctor and engineer although I got distinction in SLC. In those two years, I did not experience the different nature of mathematics and other subjects and the approaches of teaching and learning from the approaches of my past school education. A similar 'one-size-fits-all' approach was prevalent. In this duration, I had also experienced another world as a teacher of mathematics by taking tuition classes to fulfill my both academic and survival needs. This is how I entered the ocean of the teaching field. This journey motivated me to be a teacher in the future because I was loved and liked by my students. Arriving at this stage, as I reflect upon my role as a teacher, I realize that at that time, I was probably unaware of the connection between my non-academic lifeworlds and academic disciplines.

My academic journey at the bachelor level was also not so easy. I used to work in several restaurants, hotels, party palaces, and sometimes had to teach students of secondary and higher secondary level in the daytime and attended the college in the morning. In such difficult situations, I performed multiple tasks to earn money and support my family financially. I did so also because I had the responsibility to help my siblings to continue their education too. Whilst doing so, I experienced the context of living in Kathmandu where students like me had to face miserable situations to survive (Rai, 2017). Reflecting on my academic journey in bachelor's in mathematics education, now I feel that the conventionality

of education seemed to have crossed the boundary as I had become a machine to copy and paste the information. My job as a student was to listen to the teachers' or professors' lectures as prescriptions, copy the teacher's written notes or textbook, and paste or reproduce the same in the exam papers ultimately to pass that level. This might indicate the unidimensional model of providing education. Therefore, I name this method as copying-pasting pedagogy. Arriving here, I ask, *Was this a meaningful learning? How could I connect my lifeworlds with the academic contents and discourse in such a context of education? Was/is such a system of education responsible for this detachment of life and formal education?*

I belong to one of the indigenous communities of Nepal: Newar. Since childhood, I have been celebrating Newari rituals. I have experienced the unique language, rules, values, ethics, and principles of this culturally rich community of Nepal. I am proud that I was born and raised in this culture. Moreover, I involved in several arts-related activities such as dance and other cultural programs as a part of my non-academic world. However, arriving at this stage of inquiry as I reflect on it, I realize that I could find less/no connection between these two lifeworlds: academic and non-academic during my learning journey from school level to under graduation.

Figure 4. Newari culture

After the completion of my bachelor's in mathematics education, I became a member of the entrepreneurial world by starting my small business (restaurant) in collaboration with other four people. Relating my life here, I would like to cite a poplar Nepali proverb, *'पढेर भन्दा गरेर जानिन्छ'*[6]. The context I brought here might have been extremely powerful to develop some phenomenal knowledge and life skills required in this 21st century.

[6] Translation: We know more by doing than by studying

It was in 2016 when I joined one of the leading and reputed universities located in the central part of Nepal for my master's degree in mathematics education. I completed my master's degree in mathematics education in 2018 and immediately after that, I joined the same university for MPhil in STEAM education. The practices I followed in this university have become a turning point or milestone in my educational journey thereby changing my perspectives and practices of education that I developed since my primary education. I perhaps became aware of my(our) practices of educating people and associated guiding principles. I started critically thinking about hegemonic/dominant taken-for-granted assumptions, worldviews, beliefs, values, or ethos for promoting culturally decontextualized and educationally disempowering practices. Arriving at this stage, I have realized that perhaps, this has become a 'U' turn for me to think and act for exploring and enacting inclusive and empowering practices in my personal and professional educational contexts. So, I seem to have started to be a change agent as discussed by Fullan (2012). Besides these, I have been experiencing and applying the progressive and transformative visions of pedagogies, curriculum, and assessment by involving in the continuous academic discourses, critical reflections and self-reflection, activities, and projects. As a result, it has instilled me with a meaningful understanding of education by embracing the ethos that the future is not given, but it is individually or collaboratively constructed/created by people with the continuous interaction with the context and the environment. Arriving here, I can see the huge connection of my non/academic lifeworlds as coexisting elements.

While pursuing my MEd and MPhil degrees, I involved in the teaching profession wherein I taught the students of under graduation and later (while in MPhil) the students of MEd in mathematics education. At the same time, I started working as a teacher educator thereby running workshops and training for teachers in Nepal. In doing so, I deeply engaged in exploring the holistic educational perspectives thereby making people aware of the value

of lifeworlds and contexts of the students for promoting holistic development of learners focusing on all-round development consisting of physical, intellectual, emotional, and spiritual development (Nakagawa, 2018).

Despite the countless hurdles in my non-academic world or my surviving world, I always stood academically always in the top position because of my continuous devotion and determination. As far as the education system in Nepal and many other countries in the world is concerned, I was/is counted academically the brightest student. During my school education up to SLC, I was always in the top positions. I topped in the SLC examination scoring distinction marks. Such academic success continued growing and I became the district topper in my 10+2 (grades 11 and 12) examination in mathematics education. Similarly, in my college, I topped in my BEd in mathematics education. Moreover, I topped in MEd in mathematics education. Because of these excellent performances, I got several medals (some gold medals), certificates of appreciation and congratulations, and motivation from all my nears and dears. Thus, arriving at this stage of this inquiry, I delve into some questions: *were/are they sufficient for a student? Could/can they be linked with transferable skills? If yes, what are the real-world applications of those knowledge/skills, values, and attitudes? Did/do they have a connection with my/our non-academic worlds and pursuits?*

Figure 5. Me in my graduation (MEd) ceremony

I have experienced the emergent need for a debate on the de/contextualized nature of education. This is also pertinent to my inquiry as I am advocating the contextualization of learning. For me, the curriculum appears to be culturally/contextually detached, in Nepal and elsewhere, due to the Western Modern Worldview of education that promotes

decontextualized, abstract, hierarchical, and probing-oriented knowing (Luitel, 2009) and highly expert-driven, centrally designed, content-loaded, and dependent upon foreign countries framework and funding nature of the curriculum that seems to be aligned with informing images of the curriculum as discussed by Schubert (1986) such as curriculum as a list of contents, as discrete tasks and concepts, and reproduction; and product-oriented curriculum as discussed by Grundy (1987) rather than reforming and transforming curriculum images such as curriculum as an experience, as a social reconstruction, and as a currere. However, the emerging debates on incorporating ethnomathematics (D'Amrbosio, 1990) and fund of knowledge through culturally responsive teaching might be revolutionary ideas to give justice to local knowledge and wisdom traditions without neglecting the global perspective and accomplishments.

Reflecting on this academic journey, I found that my gigantic focus was on doing good in mathematics and science might enable me to promote disciplinary egocentrism (Conor et al., 2015; Pant et al., 2020) thereby diminishing the value of other subjects or disciplines. This ignorance could be the reason for me behind the separation subjects. Considering mathematics and science as difficult and the most important subjects, I became biased by prioritizing subjects both as a learner and teacher. This might also be true because of the compartmentalization view of learning where subjects or disciplines were/are taught as if they existed on different planets. Reflecting on this context, I wonder, *how can a student link the concepts across disciplines or subjects and construct meaningful understanding? How can a learner link academic disciplines with his/her day-to-day life? Is it not an issue of the disintegrated nature of education?* Raising these questions, I, as a scholar of STEAM education, have tried to explore the interconnectedness or holistic perspective of education which requires learning to be integrated and an integrated curriculum for the holistic development (Rudge, 2008; Clark, 2001). The recent emphasis on the integrated curriculum

of grades one to three in Nepal and the focus of the ministry of education in STEM might be potential evolutions in education to promote a multidisciplinary, interdisciplinary, and transdisciplinary system of education. So, this inquiry also advocates for the integrated nature of education. I am here to advocate for inter/transdisciplinary integrated STEAM education. Similarly, I am focusing on the arts-integrated as well as technology-blended educational practices for innovation in education.

My learning journey in MPhil in STEAM education at Kathmandu University has given me an opportunity to experience and practice innovative and transformative dimensions of teaching and learning for developing inter/transdisciplinary knowledge, skills, values, and attitudes. This integrated outlook of teaching and learning might be the answer to the conventionally practiced education system which has been blamed for not being able to address issues of holistic development of learners, to prepare learners for solving real-world problems, to raise critical consciousness in learners by developing metacognitive, reflective, and imaginative thinking skills, and to make them be the change agents in the society. Additionally, STEAM as a pedagogical practice appears to be developing transversal skills (UNESCO, 2016) in all the possible ways by adopting transformative methods (e.g., constructivist) of teaching and learning. While doing this, learners will be encouraged, motivated, skilled, and prepared for maximum usage of re/sources available or create new resources to solve the problems and to produce innovative things that make lives sustainable. More so, the education system assumed to blend all the dimensions of learning: cognitive, affective, psychomotor, and spiritual.

After engaging in the above discussions, I have come up with several questions such as *where is the lack or problem in our system of education? Is it because our system of education fails to bridge formal education and the lifeworlds of the learners? If so, how does the lifeworld of a learner help him/her for holistic learning experiences? What could be the*

model of education that is likely to resolve the existing problems and aims for creating this world a better place for all the lives? Followed by these thoughtful questions, in the next section, I discuss some emerging problems associated with my research inquiry.

Statement of the Problem(s)

In this section, I discuss some major emerging problems embedded in our practices of teaching and learning, in general, and of mathematics, in particular, aligning with my lived experiences.

As I illustrated earlier in the previous section, my two lifeworlds consisted of countless hurdles and difficulties. My non-academic world forced me to earn for fulfilling my basic survival needs as well as supporting me financially to continue my academic journey. In those economic vulnerabilities, I dared to complete my academic journey. Working in several brick factories as a child labor and later labor, as a waiter in several restaurants and party palaces, and running my own small business were the constructive pillars for myself and my family. More so, my Newari culture and involvement in the arts-related field were rich contexts for me. Next, my academic world constitutes the formal educational practices: my learning journey as a student, my teaching career (for about 6 years of experiences teaching school level, 10+2, bachelor, and finally master's level), and as a teacher educator now.

Although, these two worlds seemed to be separated, physically. I explored now that my non-academic worlds appear to be filled with abundant opportunities for developing meaningful learning experiences and required transversal skills (Pant & Luitel, 2020). Perhaps, they were the rich contexts for me to apply and adopt interdisciplinary knowledge/skills, good values, ethics, and attitudes. I have found them complementary for holistic education since holistic education emphasizes experiential learning; the role of arts,

indigenous knowledge, and culture; and associated real-world contexts of a learner; amongst many others. However, I have got a different story related to the formal learning context.

My formal learning journey, from schooling to under graduation in mathematics education, possibly experienced the domination of conventional notion of education governed by overly emphasized un/helpful technical human interest (Habermas, 1972) and product-based/informing curriculum to education that encouraged to promote teacher-led practices: instrumentalist, and transmissionist, paper-pencil-driven instructional practices assuming students are passive listeners and routine problem-solvers thereby ignoring the various cultural backgrounds, diverse abilities, and multiple intelligences of students. This might have been a reason behind having a poor performance of the school students in higher cognitive skills such as applying, analyzing, evaluating, and creating (Education Review Office [ERO], 2017). ERO also claims that students are weak in conceptual understanding such as representational knowledge, critical thinking, creative thinking, etc. Of several reasons behind this, the inability of integrating learners' lifeworlds through pedagogical practices could be a dominant one. This could also be one of the reasons behind having unsatisfactory achievements of the students at all levels (Poudel, 2017) and educational experiences being largely negative (Pant et al., 2020).

The entire education system seems to be surviving with the victim-blaming game (unquestioned), there is dissatisfaction at receiving end (students and society), and it is possibly guided by conventional disempowering systems of belief (Pant, 2015). It appears to be that the dominant educationally disempowering and culturally decontextualized practices are forcing to continue education through business-as-usual attitudes which lack deep and meaningful engagement including the arising issues of significance (Luitel, 2017). Additionally, National Curriculum Framework for School Education in Nepal in 2019 has

illustrated several issues embedded in school education such as the problems in quality education; problems in self/employment; lack of connection with local knowledge/skills; and lack of human values, ethics, and attitudes in human resources (Ministry of Education [MOE], 2019). So, I reflect, *why is this happening? How can we solve these issues?*

Talking about mathematics education, in particular, I feel that it seems to be culturally detached and it is devaluing the rich context of students, for example, my cultural context, which could be powerful and fruitful for the knowledge construction as well as building the required skills. Thus, the culturally decontextualized mathematics might be the reason for residing educational practices to embrace Western Modern Worldview (Luitel & Taylor, 2019) and absolutist perspective of mathematical knowledge rather it is fallibilistic (Ernest, 1991). The absolutist perspective of viewing mathematics gave rise to a philosophy that mathematical knowledge as a 'certain and unchangeable truth' (Ibid., p. 20) associated with objective reality rather than contextual reality constructed by an individual. This perhaps overemphasizes on the use of standard muted symbols, abstract ideas, and procedures to be followed to get a universally accepted answer which might refrain me from accepting mathematics knowledge as corrigible, refutable, and revisable (Ernest, 1991; Pant, 2015; Shrestha, 2018; Valero, 2006). In this regard I come up with several questions, *why are not our curriculum and pedagogies of mathematics (and others) recognizing the value of students' cultural fund of knowledge (Moll & González, 2004) or cultural, socio-economical, and political lifeworlds? Is it due to a lack of awareness about the effectiveness of students' culture and their experiences in the construction of viable knowledge and development of various skills that are potentially required for solving authentic problems? Can our educational practices have access to students' living worlds? Why? How do learners' contexts have values in relation to promote meaningful learning experiences? Are they worthwhile for engagement in learning?*

Being conscious about the potential importance of my non-academic practices which might have outstanding ideas to represent my community of practices (mostly brick factories) in the field of education so that people will be benefited and encouraged to continue their education and specifically, to learn mathematics and other disciplines in an integrative manner. More so, I am aiming to make people consciously aware of the value of their own lifeworlds, experiences, and others' lived experiences in education which were/are mostly neglected in formal academic practices. Here, I would like to request people to understand my economic vulnerabilities and how I achieve/d successes because of my belief in people's stories, and how such stories became encouragement for me and others to step forward in life. Moreover, this inquiry aims at making myself and others aware of deep-seated beliefs by critically reflecting on their rich worlds to enable themselves to transform the current practices for sustainable development in all the facets of human lives. So, my primary focus in this inquiry is to bridge my academic and non-academic worlds.

The next thread of emerging problems in mathematics and other disciplines is the lack of awareness about the benefits and values of the arts-integrated landscape of learning which is famous in STEAM education all over the world. In this regard, I would like to relate my context here. Though I was good at writing poems, dancing, singing, playing different musical instruments, acting, etc., my formal education appeared to devalue my creativity and forced me to abandon most of my interests in arts-related fields. I used textbooks of mathematics which used to have limited pictures and all of them were black and white colors. A similar practice I followed until I completed a bachelor's degree. The disempowering 'Chalk and Talk' method possibly was one-size-fits-all in teaching and learning (Luitel, 2009). Except in my formal learning journey, I had an abundance of experiences of taking part in cultural and other arts-related activities. These could be crucial since arts engage the young brain, help to develop cognitive growth, promote critical thinking and creativity,

advance social growth, introduce novelty in learning and doing, reduce stresses, improve long-term memory, and make the teaching and learning process more interesting and engaging (Sousa & Pilecki, 2018). Knowing about the tremendous benefits of arts, my advocacy here is to integrate them into learning experiences. However, they were/are detached and separated by promoting desert-like learning practices (Pant et al., 2020). So, I reflect here by raising several questions. *In what ways can we integrate arts in our instructional practices to make learning fun and to foster the creativity of students as well as teachers? How do arts help the learner be unique in their interested field of learning? In what ways does arts integration accelerate learners' skills and knowledge for solving real-world problems?*

The final thread of problematizing this research inquiry is the issue of integration of innovative ideas that I explored and have been exploring in MPhil in STEAM education and I practiced and have been practicing in my personal and professional contexts. Some of them are the integration of arts (which I previously explained), design thinking, the integration of ICTs in STEAM education, entrepreneurial learning, etc. They seem to be covered by an integrated framework of learning in an interdisciplinary and transdisciplinary setting. The education system perhaps has not been adaptable to incorporate such breakthroughs of education. This might be a problem behind experiencing a huge failure of the education system in the context of Nepal. Decreasing interest of students in STEM (Science, Technology, Engineering, and Mathematics) fields (Pant et al., 2020), the decreasing performance of students in SLC, SEE, and other national examinations (MOE, 2016, 2017, 2018, 2019), a huge gap between practical and theoretical knowledge/skills whilst implementing in the real-world contexts, and the bitter experiences of students, as well as other buddies in education, are some examples.

On the one hand, there are rapidly growing problems such as pollution, global warming, cultural extinction, loss of resources, economic crises, pandemics, crimes, several social issues, etc. These problems have been created by this and earlier generations which are to be solved by the people in the next generations. So, the next generations will not be responsible for these challenges. In this situation, *how can the upcoming generations solve these problems? What are our responsibilities to minimize the maximum effects of those problems? How can the people of this century help people of the coming generation to develop knowledge, skills, attitudes, ethical values, etc. so that they can figure out sustainable solutions to make this world a better place? What could be the role and vision of present education in terms of tackling those complex problems?*

Right from the beginning of their schooling, students have to get opportunities to be involved in making, creating, and reflecting activities, tasks, and projects. By doing this, they can collaborate to solve bigger problems in the future. In my opinion, school education should address the development of knowledge/skills and ethical/moral values from the earlier grades. However, it appears to be that the lack of awareness about the emerging educational perspectives characterized by transformative sensibilities, education context in Nepal and elsewhere is left behind. We are in the initial phase of this long journey. In this condition, this research inquiry can be one of the examples to explore the benefits of several concepts (illustrated above) to be integrated with STEAM education.

Research Purpose(s)

This inquiry is one of the representations of my experiences, critical reflection, and vision of transformative educational development. Therefore, this autoethnographic inquiry aims to bridge my academic and non-academic worlds for envisioning a transformative STEAM education as an empowering and inclusive vision of education. Additionally, I aim to improve my practice as a STEAM educator by critically examining my practices.

Research Questions

Initially, it was a challenging job for me to limit this inquiry by constructing some research questions. The most difficult task was to represent the overall inquiry in the constructed questions. By following the trend and representing the research purposes, the overarching research question I constructed for this inquiry is: How have I been bridging my academic and non-academic worlds to envision transformative STEAM education? Under this question, I developed the following four emergent research questions:

1. In what ways had my academic journey from school to under graduation shaped my identity as a conventional/traditional learner and teacher?
2. In what ways could my non-academic pursuits contribute to my becoming of a learner, teacher, and teacher educator guided by the notion of holistic education?
3. In what ways have my Masters' and post-Masters' experiences developed me as a potential transformative learner, teacher, and teacher educator?
4. How have I been envisioning a system of education for pedagogical transformation in the context of Nepal?

Significance of the Research Study

I value the endeavors of every single research study which has been contributing to the field of research and ultimately to the world. Some of them become exemplary for changing people and their practices by promoting inclusive and empowering practices. Thus, I am aware of the significance of such research inquiries. In this context, my research study has some significant roles to myself, to the people out there, and their practices.

This is my sum of autobiography and cultural inquiry that depicts my lived and living experiences in the forms of narratives (stories, vignettes, anecdotes, etc.) in which I have tried to include critical instances and contexts of my journey of experiencing the formal academic world and non-academic worlds side-by-side. As per the emerged research questions, I will

establish how my learning contexts from school to under graduation in mathematics education was dominated by conventionally designed pedagogical practices aiming to the reproduction of knowledge. Next, I explore my non-academic world by portraying how they were powerful in terms of bridging the gap between emerging visions of education and lifeworlds. Finally, I have envisioned a transformative vision of STEAM education that might help for transforming our educational practices for developing a sustainable future for all.

Significance for Myself

Portraying me and my lived experiences through this dissertation and contributing something to the wider academia is an ambitious journey for me. Up to this stage, I have read stories of people which always encouraged me in one way or the other to make significant changes in my life. Their un/successful stories instilled my knowledge and values to confront difficulties that appeared in my journey. Thus, the autoethnographic inquiry will be a suitable method for me to portray what I have experienced so far so that a significant connection between educational practices can be made thereby aiming for an innovative education model filled with transformative sensibilities. In this continuum, this research is an important project for me in many ways. First, I am excavating my untold stories and presenting them through this academic work. This has given me tremendous happiness as my stories might have got some phenomenal educational values. Second, I have tried to become more critically reflective upon my practices. This appears to raise critical awareness with spiritual values to heighten my consciousness and my personal and professional practices for embracing transformative susceptibilities. In this sense, I have given immense value to my non-academic worlds. Third, envisioning a utopian vision of education to solve some existing problems is a challenging task for me. However, I have been dared enough to envision a transformative STEAM education for sustainable development. So, this is a huge opportunity for me to

contribute something to education and myself to reach out to one pinnacle of life among many.

Significance for Other

This evocative piece of academic endeavor may be useful for other people who have their own lived experiences to share linked with educational practices that might help to bridge the gap between their academic and lifeworlds thereby developing a utopian vision for transformational changes. This piece of writing may make people thoughtful about their disempowering educational practices which need a radical change in all facets of education (curriculum, pedagogy, and assessment). When people are debating on the need of an empowering educational approach like STEAM education, this document can be helpful for them to design and implement a pedagogy or curricula which have capabilities of developing learners for meaningful learning thereby making connection among people and between people and the world.

Similarly, the researchers who want to put an effective effort to contribute to this journey may get benefit from this inquiry so that they can carry out educational research studies with the motto of bringing some phenomenal changes in the contemporary education system. For instance, they might be able to research in STEAM education. Moreover, they might get insights from the methods I have employed in carrying out this autoethnographic inquiry. This inquiry might be helpful for teachers and educators in Nepal, but not limited to, developing contextual and universal perspective of interdisciplinary and transdisciplinary STEAM education. The vision I have developed regarding transformative STEAM education might be helpful to bring changes in school and university education.

Using Theories and Concepts as Referents

Theory gives a platform to the researcher to discuss the entire matter of the research or it provides the lens/es to the researchers to zoom in the data/information to make a better

sense of it. These grand worldviews support researcher(s) to define and discuss the major implications of the study and readers to make meaning. Thus, I have used theories as referents (Tobin & Tippins, 1993, as cited in Luitel, 2009) and some crucial concepts for constructing ideas, making meaning of the data or writing, and finally discussing in the form of writing. I believe that every phenomenon is linked with some grand and/or local theoretical perspectives and concepts as we are abided by general tradition in which philosophies and theories have emerged. My lived experiences during my educational journey, during my engagement in my non-academic worlds, and my vision towards developing a transformative STEAM education, are the assets of this inquiry, which might be linked with one or more theoretical perspectives and emerging concepts. Assuming the uniqueness of the usage of theories, I use them as lenses to view my data and construct meanings out of them. For this, I have subscribed to Living Educational Theory (Whitehead, 1989), Transformative Learning Theory (Mezirow, 1991), and Knowledge Constitutive Interests (Habermas, 1972). Moreover, there are significant concepts such as holistic education, research as transformative learning, and research as envisioning that I have used as referents in this inquiry. In the following sections, I briefly discuss them.

Living Educational Theory

Human beings have a long history of practices (doing things based on personal context, pace, and interest). Beyond theoretical worldview, the practice becomes different when it comes to the real world. The assumptions of grand theories have a contradiction with real-world experiences. I have internalized solely the ideas of several theories and how it works in the practical field of education. I constructed the knowledge from behaviorist learning theories – stimulus-response (S-R) bonding to constructivist learning theories which place the learners at the center of learning to actively construct knowledge. After keeping the theoretical notions of these theories in mind, I tried to employ those theories in my teaching

and learning settings. Then, I happened to know that I was unsuccessful in many ways to implement pedagogical approaches guided by those grand theories. It vividly means that it changes everything when we encounter our natural setting. In this perspective, our living world appears to be significant while learning and its process pursues the environment that we are tackling with.

Above all, I am advocating for 'Living Educational Theory' as it could have the potentiality to explore/explain our pedagogical context that is predominant in the process of learning. The pioneer of this theory Whitehead (1989, 2008) argues that the epistemological issues related to values, validity, and generalizability have to be discussed from the living perspectives by acknowledging the significance of 'I' existing as a living contradiction. Without much denying and being dependent upon the long-rooted propositional based grand theories, students, teachers, and researchers might practice reflexivity and start the tradition of raising questions to transform the practices that allow them to build their living theory of teaching and learning. While doing this, the question: *How do I improve my practice?* (Whitehead, 2008; Pant, 2015) can be imperative for understanding living contradictions and establishing small 't' theory (Luitel, 2009) through research. Thus, for Whitehead (2008), this theory is an explanation produced by an individual for their educational influence in their own learning, in the learning of others, and in the learning of the social formation in which they live and work.

The improvisation of my practices is one of the major purposes of this research inquiry. In this regard, I have been critically reflective upon the educational practices throughout my journey as a learner, teacher, research practitioner, and teacher educator to understand the disempowering and long-situated beliefs and values to bridge my non-academic worlds. By understanding this, I develop a vision for embracing a more democratic,

contextual, constructivist, and transformative ethos to improve my practices. In this context, the living education theory best fits as a theoretical referent in my research study.

Holistic Education

As the name suggests, I consider holistic education as an educational paradigm aspiring for the development of a whole person. To put more simply, the primary emphasis of holistic education is on the overall development (i.e., physical, emotional, intellectual, social, aesthetic, and spiritual development) of the individual (Mahmoudi et al., 2012; Rudge, 2010). In the midst of the major concern of the present model of education in the development of basic knowledge and skills, holistic education advocates for nourishing the inherent possibilities of human development thereby connecting an individual to life, society, the worlds, and the entire cosmos. By supporting this, one of the holistic educators Ron Miller (2006) admits, "Holistic education aims to reconnect each person to the contexts within which meaning arises: the physical world, the biosphere, the local community, the culture with its many layers of meaning, and the cosmos itself" (p. 29). Similarly, holistic education also comprises the four pillars of education: learning to learn, learning to do, learning to be, and learning to live together (Mahmoudi et al., 2012), which are also the focus of UNESCO. Supporting these perspectives, I am using the principles of holistic education as referents in discussing my thoughts and ideas in this inquiry.

Rudge (2008) has discussed in her doctoral dissertation emphasizing on holistic education and its pedagogical application that the Eastern holistic education prioritize the practices of meditation and arts (among others) while the Western holistic education centers at experiential learning as major paths to promote principles of holistic education. Through this inquiry, I have chosen the balanced approach of the Western and Eastern perspectives in holistic education. For this, via my experiences within my non/academic worlds, I am advocating for arts-integrated, technology-integrated, indigenous knowledge, and

transformative methodologies of teaching (learning by doing and reflecting). Moreover, the integrated curriculum that I am promoting in this inquiry, appears to be directly linked with holistic education which assumes that everything in this world is interconnected and we are the elements of the same interdependent parts/relationships of the same whole or the cosmos. By this I mean, the major emphasis of my integrated nature of curriculum seeks a balance between mind and body, linear thinking and intuition, self and community, and various domains of knowledge striving for developing a conscious awareness of the relationship between the earth and the soul (Miller, 2000, 2007). Therefore, the holistic education concept is one of the crucial elements of this inquiry.

Theory of Transformative Learning

What might be the best way/s to change me and my entire society for the betterment? What might be the thing that I can use to make my future bright? And most importantly, *what can be that thing that I can work with to heighten my and others' consciousness through research? What are the beliefs, values, assumptions, and traditions that are associated with my lifeworld and educational practices? How/why did/do they promote hegemonic, pedagogically oppressed, culturally decontextualized, and disempowering practices?* These are the most echoing questions that I think of every day. The questions help me make better self and my practices. These questions seem to be the extension of my present reality in which I am thinking about myself and others. In this context, the theory of transformative learning (Mezirow, 1991) comes up here. The theoretical perspective of this theory appears to lie in communicative learning rather than instrumental worldview where we can make sense of our experiences with the world from subjective judgments.

In this context, every learner can be critically reflective on the deep-seated and long-rooted underlying beliefs, values, intentions, and attributes (Mezirow, 1997, as cited in Pant, 2017). Here, the critical reflection can be helpful in understanding and raising the questions

against existing dominant but unhelpful schemas and set of beliefs and always seek better alternatives. Mezirow (1991) states that transformative learning theory is a process by which we transform our 'taken-for-granted frames of reference to make them more inclusive, discriminating, open, emotionally capable of change, and reflective so that they may generate beliefs and opinions that will prove more true or justified to guide action' (p. 133). With this, I always try to improve my pedagogical practices by critically reflecting on my deep-rooted false consciousness about the nature of curriculum, pedagogy, and the whole education which I have experienced as a learner, teacher, and teacher educator. In this regard, I believe that meaning is constructed through learning, reflecting, and dialogue. Transformative researchers 'draw on constructivist, critical, social and arts-based epistemologies to examine reflectively, critically and imaginatively their lived experiences revealing the historical and sociocultural framing of their personal lives and professional practices' (Taylor, 2013, p. 2)

In my inquiry, this is one of the guiding theoretical referents. The theory appears to be helpful for this inquiry to raise questions towards myself and against educational practices. In the process, I use the five interconnected ways of knowing as illustrated by Tayler (2015): cultural-self knowing (i.e., understanding who am I as a person?), relational knowing (i.e., understanding what thing makes me different from others?), critical knowing (i.e., understanding how can I change myself and my practices to make equitable society?), visionary and ethical knowing (i.e., thinking about what I am thinking), and knowing in action (i.e., understanding what differences can I make in my current action?). Through this, I heighten my consciousness and ability to do practices informed by the theory of transformative learning for becoming a change agent.

Research as Transformative Learning

Drawing upon the theory of transformative learning, I am also using the notion of research as transformative learning in my inquiry. Before I started writing this research

inquiry, I started the process of transformational learning journey because one of the major sources of this inquiry was my critical self/reflection upon my as well as other's deep-seated, long-rooted, and cherished hegemonic, taken-for-granted-assumptions arising from various un/helpful socio-cultural, political, and educational phenomena. This inquiry, I consider, as one of the transformative awakenings for me as well as you (readers) to embrace 'praxis' for the inclusive and empowering practices in our personal and professional lifeworlds. I believe that research inquiries or studies have been conducted so as to solve some of the existing problems, make a community of people aware and conscious, and eventually encourage people to enact new practices for the wellbeing of humans and the world. These might be the emergent focus of postmodern research inquiry, I believe. In this dictum, this inquiry is also in the same boat.

This inquiry, for me, was an incredible learning through which I became aware of myself with the self-transformation aspiring to become an agent of change. This has become helpful for my professional development since I have taken research as/for professional development. In the process, I might be able to develop my heightened consciousness through higher-order abilities such as critical awareness and critical self-reflection, ethical and political astuteness, empathy and compassion, and visionary and altruistic perspectives (Taylor, 2015, as cited in Luitel & Taylor, 2019). The entire process of this inquiry is a transformative journey for me and others who are in/directly connected with this inquiry.

Knowledge Constitutive Interests

Knowledge constitutive interest developed by Habermas (1972) deals with three interests embodied in human existence (i.e., technical, practical, and emancipatory interests). It flourished in education from sociology which helps people understand how human interests influence educational constructs. More specifically, it influences how knowledge is constructed.

The technical human interest is based on normative-empirical analytic science which gives rise to the hypothetico-deductive model of logic. The interest has an immense potential to control the natural environment through rules following actions based upon empirically grounded laws (Grundy, 1987, as cited in Shrestha, 2018). This is the very foundation for many to construct knowledge that emphasizes on instrumental (cause-effect and objective) and technical rationality (i.e., figures, definitions, rules, algorithms etc.). This seems very apparent to our practices of teaching and learning in which curriculum is considered as a list of contents or subject matters, discrete tasks and concepts and cultural reproduction; assessment is for grading or marking students' quantitative ability to get marks, and teaching is as/for knowledge transmission. I have used this theory to understand and discuss how our educational practices are in/directly guided by technical rationality. While addressing the first research question, I realized that technical interest was dominant in my educational journey from school to bachelor's degree in mathematics education.

Second, the practical interest is embedded among people 'in here' and emphasizes on the construction of knowledge being people together. This is guided by the historical-hermeneutic (interpretive) perspective and has social science dimensions. This interest focuses more on interaction, subjectivity, context, and consensual understanding (Habermas, 1972). The teaching and learning setting incorporate a genuine discussion and understanding of the different perspectives of learners while making decisions thereby accepting that students have already learned something previously. This is applied in our democratic practices. I use practical interest in this research to make viable inter/personal understanding of various dimensions of my journey as a learner, teacher, and teacher educator which embody the communicative spaces believing that communicative knowledge is the understanding of ourselves, others, and the social norms of the community or society people live (Cranton, 2002). In doing so, practical interest is useful in many ways to give the

reference to my second research question that emphasizes my non-academic worlds and their natural connection with educational practices. While bridging the gap between both worlds, there is a need of interpretations and discussions.

The third, Habermas would like to call 'pure' (grounded in the reason) and promote is: emancipatory interest. Responsibility and autonomy are the major two grounds for emancipatory interest (Pant, 2015). This has the potentiality of the emancipation of society which links to justice and equitable being. For this, the person should be a change agent who unearths the false consciousness embedded deeply in human practices for people to make them free persons from the coercions. Thus, emancipatory interest is needed for social justice and freedom (Grundy, 1987, as cited in Shrestha, 2018). In doing so, praxis is needed for making self and critical reflection on their ongoing practices. The critical consciousness helps students ask questions about their in/ability, act against the status quo, raise voice against inequality and inequity practices inside and outside the classroom.

I, as a research practitioner, believe in student's emancipation in learning and praxis in education (Grundy, 1987). In this perspective, emancipatory interest applies to my study as I will be free from restrictions to think critically, learn independently, and make my own decisions (Habermas, 1972). I created my understanding of concepts from the narratives I generated from my lived and living experiences by assuming that every individual could have the potential to flourish, intelligence to be developed, and the power to change. Later, I developed my own empowering and enabling vision for STEAM education. So, this interest could be apt for this inquiry.

Research as Envisioning

One of the greatest challenges in this inquiry, for me, was to immerse critically, creatively, and imaginatively in 'things as if they could be otherwise' (Green, 1995, p. 16). This soulful inquiry was quite painful but gainful for me while portraying the narratives from

my non/academic lifeworlds, generating the meanings, and discussing the perspectives dialectically aligned with those meanings. Yet, it was extremely difficult for me as a research practitioner to come up with inclusive and empowering alternative perspectives and practices. Nevertheless, I tried to explore my visions throughout this inquiry. Here, my sincere concern is towards the use of educational research to envision or making a vision that holds the sustainable development characteristic – is a process of transforming the learner's (including teachers and others) habituated ways of knowing, acting, and valuing rather than inculcating the basic knowledge/skills (Luitel & Taylor, 2019). Envisioning a better alternative or future is the process of using higher abilities and spiritual sensibilities to see or visualize the future and try to depict those futuristic images via research inquiry. I believe that a research practitioner in education, while conducting their research, explores the past and contemporary phenomena existing in the education system with the help of critical reflection and, based on this, s/he tries to envision the future. I am using the concept of research as envisioning to explore better alternative educational perspectives and envision a transformative STEAM education. Therefore, this is one of the crucial concepts that I have used in my research.

Recapitulating the Chapter

With this chapter, I started my journey of this research inquiry based on my lived experiences of two seemingly separate lifeworlds: academic and non-academic. This chapter is the general background or introduction of this entire autoethnographic inquiry. I started it by providing a bird's-eye view of my inquiry by articulating some of the pressing problems I encountered in the field of education. I stated the central purpose(s) of my inquiry: to bridge my academic and non-academic worlds for envisioning a transformative education and to improve my practices as a transformative STEAM educator being a critically reflective practitioner. Based on these purposes, I constructed overarching research questions and based on this, I developed four emergent research questions to capture this entire inquiry. I

articulated the significance of this inquiry for myself and others. The theories and concepts are the crucial referents for this inquiry. Thus, I discussed three broad theoretical perspectives: Living Educational Theory, Theory of Transformative Learning, and Knowledge Constitutive Interests, particularly, its implementation in this inquiry. Moreover, I discussed some of the essential concepts such as Holistic Education, Research as Transformative Learning, and Research as Envisioning that I used as referents in this research inquiry.

CHAPTER II

ASPHALTING MY RESEARCH PURSUIT

Chapter Overview

In the previous chapter, I unfolded the issue of my research inquiry by centralizing to my field of research that emerged from my lived experiences based on my multiple roles in the academic world (a learner, teacher, teacher educator, and a research practitioner) and non-academic worlds thereby illustrating the major aim of the inquiry: bridging the academic and non-academic lifeworlds to envision a transformative STEAM education. I discussed some of the contemporary issues regarding educational practices and widespread people's beliefs, values, and attitudes towards the entire education system. Emphasizing on the purpose of this inquiry, I developed four research questions. The first research question represents the exploration of my academic world whereas the second represents my non-academic lifeworld. The third research question was designed to address my transformative shift in thought and actions in my personal and professional contexts. Finally, the fourth research question was for developing my vision of transformative STEAM education as a result of my prior exploration of the respective research questions. Arriving at this point of inquiry, I ask myself a question: *how do I carry out this inquiry to better address, but not limited to, those arising questions?*

As a research practitioner, I wholeheartedly accept that there is no royal road to research method. It is the job of the researcher who has accountability to tactfully select a better road so that s/he can better respond to the emerged/developed questions. In this regard, based on my research purpose and emergent questions, I have developed this chapter to discuss how I am going to carry out this scholarly rich journey.

This chapter demonstrates how I crafted my research avenue for conducting and making it a constructive culminating product. For this, this chapter incorporates the philosophical underpinnings of this research study, the paradigms under which this research is spread, autoethnography as methodology, the process of narrative generation, basis for narrative generations, multiple logics and genres that I used throughout this research, quality standards I ensured in the process of researching, ethical priorities to avoid unethical traits in the research, and finally an overall reflection of this chapter.

My Philosophical Worldviews

I believe that human beings cannot be separated from certain philosophical underpinnings. These worldviews or perspectives guide human's thoughts and actions. In this section, I discuss some of the philosophical foundations that guide my ways of valuing, ways of knowing, ways of being/becoming, and ways of doing. Also, they guide me before, during, and after the writing process of this research inquiry.

Axiology: The Standpoint of Contestation and Change

Axiology, in research, is associated with how the values, beliefs, thoughts and actions of the researcher influence the research. 'I' as an integral part of this society and my educational journey, this research study has been influenced by my values, beliefs, actions, and interpretations of the text. Considering that social science research is not value-free (Gouldner, 1970, as cited in Luitel, 2020), my deep-seated and emergent values might skew the entire research inquiry. In this research, I am the actor in this academic endeavor. Meaning, from the beginning to the end of this research including the generated narratives are my experiences: my ups and downs, my actions, the moments of joyous and sorrow, the moments of highs and lows, the moments of critical turning points, the moments of intellectual being, the moments of becoming with heightened consciousness, etc. being involved in my non-academic lifeworlds and educational practices. The narratives and

dialogues are associated with my own experiences that govern the entire research process. In this, my own values are integral parts of this inquiry. Hence, I subscribe to a value-laden perspective in this inquiry.

Ontological Assumption: The Becoming of Change Agent

Throughout my learning journey being a part of this society, I came across that ontology is about raising the basic question regarding the nature of reality and the nature of human beings in the world (Denzin & Lincoln, 2018). To date, I have de/constructed the meaning of the world, I was surrounded by, being as an external to the social actors and considering reality as social constructions built up from the perceptions and actions of social actors (Bryman, 2016). However, I believe that every social phenomenon has multiple realities and my job as a researcher is to excavate them and paint them in this research writing being dialectical of the singular conclusion.

Of my learning experiences, my academic journey as a learner before my MEd in mathematics education and the beginning of my career as a teacher was characterized by seeking the singular truth. Nevertheless, after my MEd, I have realized that the truth has multiple existential meanings that depend upon a person who is grasping the truth. As per my experiences, I have become a truth seeker and constructor believing that the truth is not given but constructed by us. Throughout this research study, I have been guided by exploring the diverse meaning of every phenomenon which I experienced as a learner, teacher, and teacher educator, and various roles in my non-academic worlds thereby becoming an agent of change. These phenomena will be associated with more than one connecting realities. Connecting every experience with both (p)hilosophical and Philosophical perspectives, I have generated every narrative based on my experiences grounded in my lifeworlds.

Epistemology: Knowing and Knowledge for Empowerment

As to my experiences, for a long period, I was guided by the absolutist view of knowing that refers to knowledge as an ultimate or as a culminated product believing that knowledge is objective. I had beholden, till my BEd in Mathematics education, that knowledge is somewhere outside my context, in the form of an object, and I should focus on a linear approach to grab that knowledge. Thereafter in my educational journey, I have been continuously involving in the practices where knowledge is constructed within the contexts of the learner through constructivist and subjective interpretations. So, I believe that knowledge is subjective, as historical conventions and context-oriented (Ernest, 2006; Pant, 2017). In such a context, I acquire knowledge through direct experience, through observing the actions and consequences of others, and through explicitly codified sources such as books, papers, etc.

In this research process, I should understand how I understand and research the world (Cohen et al., 2018). I should explore my own 'multiple ways of knowing' (Denzin & Lincoln, 2018) believing that knowledge is grounded in the context and every person creates their phenomenon as a result of prior experiences in the existing socio-cultural context. I certainly do not deny the objectivity in knowing something, but I am taking a subjective stance to construct the meaning of every phenomenon throughout this inquiry. I acknowledge the multiple perspectives on my experiences that exist in my pedagogical and living practices. Therefore, by understanding that an exclusive postmodern epistemology of knowing as ironic gazing is likely to over celebrate the ironic aspect of language, thereby reducing knowledge to an exclusively subjective, unsolidified, and fragmented form (Luitel, 2009), I subscribe to more constructivist epistemology to advocate knowing/knowledge for empowerment.

Multi-Paradigmatic Research Design Space

When I went deeper into the world of research paradigm or worldviews of research, I encountered several research paradigms from positivism to integralism (Taylor & Medina,

2013). In the process of understanding these paradigms, I oftentimes got into trouble to select a particular research paradigm under which I could conduct my research inquiry meaningfully. I always used to be in a dilemma because each research paradigm was insufficient in addressing the central issue of my research inquiry. I was confused about limiting my investigation to a certain research paradigm. For instance, when I was writing my experiences in the form of interpretation, the interpretivism seemed fine, but sometimes these interpretations had critical standpoints and perspectives, the criticalism was required. Again, while writing these narratives using arts-based forms, postmodernism seemed relevant. In this case, the insufficiency or inadequacy of one research paradigm led me to conduct my research study by integrating more than one research paradigm. For this, I used a multi-paradigmatic research design (Taylor et al., 2012; Luitel, 2019).

Based on my philosophical orientation, in this inquiry, the assumptions are aligned with qualitative research inquiry. So, this serves me to use interpretivism, criticalism, and postmodernism research paradigms in one place. The interpretivism enables me to articulate contextual exploration of my academic and non-academic worlds. Also, the paradigm allows me to interpret both worlds thereby seeking a worthwhile connection between them. Criticalism addresses my critical standpoints whilst being a change actor in my own personal and professional lifeworlds. This offers me an outlook to critically reflect on my and others' practices and allows me to raise critical questions against unjust educational, social, and cultural practices. Finally, postmodernism provides me with a place for portraying my narratives, stories, epiphanies, etc. through stories, pictures, diagrams, and other arts forms. This is for using multiple genres while cultivating different cases and presenting them in artistic ways.

Research Paradigms

As to the previous part, this research inquiry is under the surveillance of multi-paradigmatic research which comprises three paradigms: interpretivism, criticalism, and postmodernism. I present the discussion of these paradigms regarding what, how, and why they are associated with my inquiry in the following subsections.

Criticalism

At the beginning of the time of framing this research inquiry, there were two questions emerged in my mind. First, *why am I not satisfied with what I am doing?* More generally, *why am I not satisfied with the past/present educational practices?* Second, *why do I need an alternative perspective?* Immediately, I found myself in the ocean of criticalism as a research paradigm. There are critical instances or positions throughout the journey of experiencing academic and non-academic worlds that made me raise questions against my and others unjust and dogmatic practices, think consciously to choose better options, and do socially justified actions. As a social being, people have been confronting several social imbalances, inequities, and inhuman practices. Being a social science researcher, my job is not only to explore and interpret the existing social phenomena but also to empower others to become imaginative and critical thinkers (Tayler & Medina, 2013) capable of fighting for social justice and enabling 'deep democracy' (Kincheloe & McLaren, 2011). In my opinion, researchers should unfold those stories and contexts where power imbalances are practiced. Through this, participants are able to see how stereotypes, hegemony, the culturally decontextualized world of participants (Luitel, 2012) are practiced by oppressors (Freire, 2005) to be in power. By identifying social unjust structures, a researcher is likely to be able to empower people to raise their voice with critical questions against status-quo and taken for granted assumptions regarding our educational practices, critical voices for the change, and so on. Critical paradigm fuels the researcher to become a 'change agent' (Fullan, 2012). So,

critical educational research is not merely to explain or understand society but to change it with emancipation.

Whilst depicting my lived experiences and developing a transformative vision, I became a critical practitioner by subscribing to 'outward criticality' and 'inward criticality' (Luitel, 2009) which allow me to finger point others and myself. Being outwardly critical, I have reflected upon the practices of teaching and learning, curriculum, and assessment. In this, I am raising the questions against these unjust and imbalanced practices being an outsider. Next, considering outward criticality would not be efficient for me to heighten my consciousness and promote transformative visions. In this vein, I am pointing fingers towards myself by reflecting on my practices and raising critical questions. In this regard, I assume that after reflection the world is not the same (Brookfield, 2017). The critical perspectives in my research subscribe to the emancipatory human interest as discussed by Habermas (1972). Through this research, I am critically exploring, examining, and analyzing the unjust and hegemonic traditions to portray how traditional ways of education promote educationally disempowering practices, becoming a conscious being for understanding how my non-academic worlds were/are complementary to bridge the gap between theory and practice, and being responsible for developing my vision of transformative STEAM education that aims to design a practice for sustainable development.

Postmodernism

As a human being, I enjoy being surrounded by different forms of arts. As in history, arts are inseparable from human evolutions. Each culture has its own ways of expression, presentation of their culture, and ways of representation. This is what makes each culture in this world unique. In this context, as Taylor and Medina (2013) stressed, there is no window in my (researcher) head to look into my mind and see exactly what I mean. So, I pondered on how I can best present my narratives so that people can solely understand what I mean. This

is how postmodernism allows a researcher to use multiple arts-based genres to present the ideas. Beyond the one-size-fits-all or conventional linear (proportional, deductive, and analytic logics and genres) approach of capturing the narratives (Luitel, 2009; Luitel & Dahal, 2020), I have been fanciful to use various means of arts-based communications. In doing so, I believe that people need the representation of thoughts and feelings through various means of communication such as art, dance, gesture, poem, etc. (Taylor & Medina, 2013).

Accepting the power of multiple genres to portray, I am using dialectical, metaphorical, narrative, and non-linguistic genres in this research inquiry to better capture the multi-layered meaning and multiple impulses in the phenomenon. These allow the readers to have a genuine understanding of my ideas and feelings through the mind, and body – in an integrative manner. On top of this, postmodernism is applied in my inquiry to support my transformative professional development through the aforementioned genres.

Interpretivism

As a social science researcher and socially emerged actor, I should be cautious about how and why the context of being is so prevalent in the ways of knowing and ways of valuing. This inclusively refers to understanding the ground of a person to understand her/him as a human being. The interpretive researcher has the aim of understanding other communities from deep inside by standing in the shoes of participants (Taylor & Medina, 2013). In the perspective of understanding and constructing the meaning of the academic culture (Pant, 2015), the interpretivism is apt for me to explore as an integral part. In this, I believe that the contextual interpretation and reflection on the meaning generated are helpful to understand the culture and construct the new version of meaning. Accepting research as/for exploring the ground of the context to be researched, interpretivism guides me to present

substantial descriptive of the details that are essential in contextual understanding (Bryman, 2016).

In this perspective, I believe in the socially constructed multiple realities. These realities are associated with the practices of teaching and learning as a learner, teacher, and teacher educator, and my practices in non-academic worlds. Interpretivists see reality through interpretive eyes as reality is created not discovered and reality is out there in the social setting. To unfold these realities, one should be a part of that society as well as interact with the social phenomena. In this process, the person should not perceive reality as a passive-receptive process of representation but as an active constructive process of production (Flick, 2004). As per my understanding, in an interpretive world, different researchers bring different perspectives to the same phenomena. Researchers are not detached from the subject they are studying but an inextricable part of the subject.

Thus, this paradigm offers me to explore my practices of being and becoming a person, a social actor, a learner, a teacher, a researcher, and a teacher educator. Since this inquiry is the product of my lived and living experiences in academic and non-academic worlds, interpretivism is assisting me to interpret or portray every phenomenon I lived to offer context-based interpretations of those phenomena, issues, and problems under considerations via narratives of my experiences (Taylor, 2013). I am excavating and unfolding my both worlds by making a bridge between them to envision a better alternative for educating people. Therefore, interpretivism is one of the research paradigms for my research inquiry to generate context-based understanding.

Evocative Autoethnography as Research Methodology

Up to this stage, I have de/constructed the meanings of lives and phenomena by following others, observing what people did and are doing, and reflecting upon my ways of learning and being which were integrated with several critical and emotional instances.

Presenting my involvement in several cultures, I was surrounded by an educational culture in which I played and have been playing my roles as a learner, teacher, teacher educator, and finally research-practitioner. Besides academic context, I lived through various non-academic cultures (Newari culture, brick factories, restaurants, etc.) and has got rich experiences that are characterized by essential life skills, values, beliefs, assumptions, feelings, and emotions. Here, I perceived the meaning of culture as 'a group-oriented concept by which self is always connected with others' (Chang, 2016, p. 13). This shows my role in the intersection of my cultures and myself. Given this context, I recognize and acknowledge the value of others and my lifeworlds (non-academic) by observing the huge possibilities to integrate them into academic or learning contexts.

Whilst situating myself in the ocean of research methods to accomplish this project, I have gone through hurdles in terms of selecting one research method that serves my research issue and gives justice to this project. Choosing a research method is a nerve-racking experience for every researcher out there. In a similar context, intellectually, it is a painful journey for me. As to my issue of this research and emerging research questions, I should be aligned in between representing both my culture of education and my lifeworlds. I have to be a nexus between my living world and the learning culture where I belong to. I have to be a storyteller, narrator, and interpreter to depict my scenarios to the reader considering 'self is subject to look into and a lens to look through to gain an understanding of societal culture' (Duckart, 2005, as cited in Chang, 2016, p. 49) so that they can consciously understand me and my culture thereby contributing to the knowledge domain.

Given this context, I have selected evocative autoethnography as a research methodology to provide justice to this research project. Made by three interconnected triadic terms auto (self), ethno (culture), and graphy (research process), I use autoethnography to portray 'selfhood, subjectivity, and personal experience ("auto") to describe, interpret, and

represent ("graphy") beliefs, practices, and identities of a group or culture ("ethno")' (Adams & Herrmnn, 2020, p. 2). Ellis (2004) defines autoethnography as 'research, writing, story, and method that connects the autobiographical and personal to the cultural, social, and political' (p. xix). These texts are usually written in the first person and feature dialogue, emotion, and self-consciousness as relational and institutional stories affected by history, social structure, and culture (Ellis & Bochner, 2000). This means that the researcher is always at the intersection of culture and self in the research process. In this process, I, as a researcher and research participant, and my culture are the subjects to be researched. Meanwhile, I am only the communicator and storyteller (Ellis & Bochner, 2006). Throughout this research project, I portray my narratives and stories being involved in the process of educating myself and others in the context of my educational cultures that were characterized, from my conscious vantage points, by conventional and disempowering practices in the beginning and later by constructionist and transformative worldviews that becomes more empowering and utopian practices for me to embrace continuous development and emancipation in my personal and professional life.

I use evocative autoethnography to portray my experiences within my culture of education being critically reflective believing that this method serves concrete action, emotion, embodiment, self-consciousness, and introspection to craft my journey as an autoethnographer (Ellis, 2004; Chang, 2016). As a method, autoethnography combines autobiography with ethnography (Ellis et al., 2011, as cited in Cohen et al., 2018), and Chang (2016) argues that it should be ethnographic in its methodological orientation, cultural in its interpretive orientation, and autobiographical in its content orientation. This may include writing about moments of existential crisis, turning points (‘epiphanies’), and life-changing moments. In this regard, narrating the self and embodied characteristics of my culture is imperative to make me and others aware that encourages them to promote more progressive

and empowering practices in the future. Thus, autoethnography, in the words of Spry (2001), is 'a self-narrative that critiques the situatedness of self and others in social context' (p. 710). This becomes even more powerful to present my living stories to the audience and make them understand my social phenomena in which I interacted as an insider, I played my role being a player and coach or leader, thereby evoking readers to access and re/examine their lived stories.

I endeavored to understand myself through my experiences so that I can understand my social context or the context I had/have attached with my worlds. So, I endeavored to understand myself (Adams et al., 2016) to enter the world of others. More so, I have used autoethnography because this is an insider's methodology where the researcher's personal and professional experiences become the foundations for the inquiry (Luitel, 2009). In the same vein, I believe that autoethnography is again a form of inquiry as mentioned by Luitel, writing, and/or performance that raises questions and 'issue of being' into circulation and dialogic process (Bochner, 2016). So, autoethnography emphasizes 'me' to understand the 'others' (Ellis, 2017). Also, autoethnographers turn to the narrative and storytelling to give meaning to identities, relationships, and experiences and to create relationships between past and present, researchers and participants, writers and readers, tellers, and audiences (Admas et al., 2015). Thus, an autoethnographic methodology contributes (especially in this research) to the view that reality is constructed through the portrayal of the researcher's (my) experiences in a cultural context (others) (Spry, 2018). Expressing my lived experiences through deep engagement in the ongoing cultural activities throughout this research enabled me to cultivate new and personal ways of knowing that could emancipate from 'one size fits all' approaches (Adams et al., 2015). Spry (2018) argued, "autoethnographic works often conceptualize the other for the purpose of understanding self" (p. 1094). This might be essential when the researcher reviews personal experience reflexively, usually

retrospectively, form analyses and distils key issues about autobiography from an ethnographic stance, i.e., what the personal experiences say to the reader about culture, values, relations and society concerning the topic of research interest.

The Process of Narrative Generation

Oftentimes, I tried to learn by questioning myself, writing about my lived experiences and reflecting upon my thoughts and actions, and inquiring about the futures. In this process, I could develop a deeper understanding of my lifeworlds. The vivid and powerful experiences were/are shaping both my thought and actions. They become imperative to understand me within my culture of academic and non-academic worlds. KU's educational practices during my MEd and MPhil degrees appeared as reasons for turning myself towards a transformative journey. I became aware of the implicit and explicit values of my non-academic lifeworlds to integrate with academic practices to promote the notions of holistic education. In this sense, my lived experiences have become my best teachers for learning to learn, to do, to be, and to live. So, the presentation of narratives appears to create a phenomenon for a reader to learn from them, to ask questions to oneself, and to generate meaning from it.

I am using narrative as an inquiry and 'field texts' (Clandinin & Connelly, 2000) that makes the personal experiences contextually meaningful. Through writing narratives of my both (academic and non-academic) lifeworlds, I become more consciously aware of my past and present practices. In doing so, I am motivated to be critically reflective in the process of writing narratives presenting my experiences thereby trying to germinate better future possibilities. So, engaging in writing narratives and asking from very basic questions to more complex philosophical questions might make people to de/construct the meaning. In my case, I write my lived experiences to make myself and others (readers) aware of the practices we (you and me) are embedded in.

Concerning my issue of this research, I tried to enable my perspectives towards understanding my practices with the help of my living stories. These narratives are to understand my socio-economic, cultural, political, and educational contexts in which I presented my critiques, critically raised the voices against unjust practices, and heightened my consciousness to promote empowering practices. Using various genres of writing, under the postmodern paradigm, I have presented stories so that readers can verisimilitude in their context. In this manner, autoethnography allows me to depict my journey in the forms of narratives. Narrative inquiry provided me with a window to explore the assumptions inherent in shaping the stories of mine. I continuously and introspectively interacted with my lived experiences to excavate the underlying assumptions through the stories, made meaning after interpretations, and portrayed my evocative stories throughout this research inquiry. So, this is about interacting with self and my experiences and making meaning out of those narratives.

As an autoethnographic researcher (henceforth autoethnographer), I have tried to enable myself to write my stories and narratives so that people can understand what/how/why I was going through such a culture of learning. Upon those narratives, people may conceive what/how/why those cultures of educational practices circumscribed me to embrace those practices and later enhance my capabilities to become an empowering educator. So, this is a venture in which I am narrating and storying my lifeworlds through autoethnography as a methodology. While doing this, I am also aware of pedagogical thoughtfulness.

Narrative as a process of inquiry, I tried to create a set of criteria that allow me to include/select narratives of my life. Based on my research purpose(s)/question(s), I chose significant events and incidents and experiences among numerous. It was a challenging job for me to select a few narratives from an ocean of my lived experiences that have inherent potential to address the major issues of this inquiry. Accepting this challenge, I chose

narratives based on their relevance for discussion, availability of memory (depending upon how much I could remember), and the connection with macro history or prominent past events (the contemporary history from where narratives emerged). In doing this, I confirmed the events and contexts by discussing with others (parents, friends, teachers, and other stakeholders). After selecting them, I created a timeline (see below). During the inquiry process, research questions and chapters emerged accordingly. While developing the respective chapters, I crafted narratives based on the vantage points of now and then using the emergent theories and concepts as referents to provide the general and wider meaning. In the process of interpretation, I involved in meaning un/making process with the back and forth process. Finally, I have constructed a vision through an act of creative imagination being reflectively aware.

Basis of Narrative Generation: The Sources of Narratives

Before starting this journey of writing inquiry, I pondered on the sources of my lived and living experiences to depict through this autoethnographic venture. I should be cautious about representing myself and my cultures through this investigation in the form of creative narratives. In so doing, I have created timelines of my experiences and presented sources of the data. I started this journey of revealing the events and epiphanies since my birth in an economically deprived family – having brick making/producing as a major profession which lasted for 18 years since my birth. Meanwhile, I completed my school education. During two years of my 10+2 in mathematics education, I involved in teaching and worked as a waiter in a restaurant. Similarly, during my bachelor's in mathematics education, I played my roles, besides learning journey, sometimes as a teacher and sometimes as a waiter. After this, I started my small business as an entrepreneur. In 2016, I started my master's degree in mathematics education and later in 2018, MPhil in STEAM education. During this period, I enjoyed the teaching students of BEd and MEd in mathematics education. I also played my

role as a teacher educator to assist teachers and researchers in their professional development. Above all, I also represent Newari culture and various arts-related activities. The table below captures my overall journey and the sources of narratives.

Table 1

Chart for Data Generation

Inquiry Theme	Representative Chapter(s)	Research Question(s)	Source and Timeline of Data
Crafting my Academic Journey: Revealing Conventionality	Chapter III	In what ways had my academic journey from school to under graduation shaped my identity as a conventional/traditional learner and teacher?	From school education to under graduation in Mathematics education (1998 – 2016)
Crafting my Non-academic Pursuits: A Scenery for Holistic Education	Chapter IV	In what ways could my non-academic pursuits contribute to my becoming of a learner, teacher, and teacher educator guided by the notion of holistic education?	From school education to under graduation in Mathematics education. Additionally, some contexts in master's journey (1992 – 2016)
Unfolding my Possible Transformative Shift-in-Making	Chapter V	In what ways have my Masters' and post-Masters' experiences developed me as potentially a transformative learner, teacher, and teacher educator?	During my master's in mathematics education and post-master's (MPhil) in STEAM education (2016 – 2020)
Envisioning Future(s) with STEAM Education	Chapter VI	How have I been envisioning a system of education for pedagogical transformation in the context of Nepal?	Emerged during my MPhil in STEAM education and my writing of this emergent inquiry (2019 – present)

The table outlines the timelines and sources of my narratives that I used throughout this research inquiry. In the following chapters, I present, interpret, and make the meaning using these narratives, stories, dialogues, etc.

Multiple Logics and Genres

Possibly, it is the biggest challenge for a research practitioner to capture every phenomenon and its meaning embedded in the data text in the qualitative research study. For me, it was a difficult moment to present my experiences and expressions through a single way of writing narratives to communicate with data texts or my field texts, theoretical perspectives and concepts, and the readers. Arriving at this stage of inquiry, I am in the dialectics of conventionally separating narratives and interpretation. I do not disagree with the notion of grand narratives in research writing, but I am in favor of blending the narrative and interpretations with the help of various methods of representation. I am also engaging in the confessional, impressionist, and realist tales as discussed by Van Maanen (2011) in my inquiry. Therefore, I have used the following logics and genres in this inquiry.

Dialectical Logic and Genre

Knowing that every coin has its two sides, I am aware of the advantages and pitfalls of every perspective that I discussed throughout this inquiry. I employed dialectical logic and genre (cf. hypothetico-deductive logic and genre) to promote and maximize the potentials of synergistic and complementary worldviews (e.g., holistic) (Luitel, 2009, as cited in Shrestha, 2018; Luitel & Taylor, 2019). As dialectical logic imagines realities resulting from a dynamic interplay between so-called opposing categories as, for example, theory cannot be perceived without practice and vice-versa (Taylor, 2013, as cited in Luitel & Dahal, 2020, p. 4). Therefore, I enjoyed perspectival writing to minimize the influence of the use of linear, dualistic, and prescriptive nature of writing, thereby engaging in deep, embodied, and intimate voices and vision about my research and practice (Saldaña, 2018). Thus, from the beginning (Chapter I) to the end of this research inquiry, I used this perspective of writing.

Metaphorical Logic and Genre

Enabling multi-schema envisioning and elastic correspondence between conflicting schemas to capture the complexities of a phenomenon (Lakoff & Johnson, 1980, as cited in Shrestha, 2018), I engaged in a literary presentation of my thoughts and actions through diverse metaphors such as examination as battlegrounds, xeroxing pedagogy, teacher as researcher, teacher as social justice actor, etc. (see chapter III, IV, V, and VI amongst other). These are few live metaphors, which require a context and certain creativity to interpret adequately (Fraser, 1993, as cited in Tracy, 2020). I employed multiple epistemic metaphors as a conceptual system that are connected through an allegorical, analogical, proverbial, mythical, and ecological system of thought (Luitel, 2009, Luitel & Dahal, 2020) to reduce the domination of hypothetico-deductive system of logic and genre. This assisted me in projecting the meaning of one perspective in terms of others thereby essentializing several imageries embedded in my academic and non-academic lifeworlds. Meanwhile, I enjoyed these metaphorical expressions to become more critical and practice emancipation throughout this writing journey.

Narrative Logic and Genre

Portraying my lived and living experiences in the form of narrative as 'field texts' to capture multiple layered and dimensions of lifeworlds (Clandinin & Connelly, 2000), I have become a narrator and storyteller throughout this research inquiry. Narrative logic and genres are used 'to bring forth contextual accounts arising from our actions (and inactions) in the lifeworld' (Luitel & Dahal, 2020, p. 5). Employing three different categories such as resistant, healing, and advocacy as discussed by Luitel and Dahal (2020), I envisioned an inclusive, equitable, and empowering practice of education with transformative sensibilities (see Chapters III, IV, V, and VI). In this manner, narrative logics and genres are the central focus of this research inquiry.

Non-Linguistic Genre

I believe that 'a picture is worth a thousand words'. In this regard, I have used non-linguistic genres (pictures, paintings, montages, creative models, etc.) to provide/illuminate the visual/imagery sense of my research texts so as to 'demonstrate the multi-vocal, embodied, and nonlinear nature of knowledge claim' (Luitel & Taylor, 2019, p. 11). In my opinion, they are crucial to arts-integrated research study since they capture the deeper and broader phenomena of the research writing. Moreover, such forms appear to be central to generate pedagogical thoughtfulness among readers (Luitel, 2019). You (readers) can experience this flavor in chapters III, IV, V, and VI. Besides, I have used the figure number to denote the context-based figures or pictures, but I have not used figure numbers for metaphor-based images and models.

Ensuring Quality Standards in my Inquiry

Maintaining the quality of data, its presentation, and the quality of the entire research is a challenging job for a researcher or research practitioner like me. Besides positivistic and post positivistic research methods, ensuring quality standards in constructivist and critical research studies is a crucial and difficult task throughout the research. As far as research is concerned, the quality standards are truly essential to guide the entire research construction (Lincoln & Guba, 1985, as cited in Cohen et al., 2018) and presenting research to the audience with a greater quality. My research has the foundation of multi-paradigmatic research. In this case, the visibility of quality standards matters in a wonderful degree. In this section, I am going to discuss some of the quality standards that I ensure in this inquiry to make it more trustworthy, original, viable, and lively.

The case of quality standards in autoethnographic studies is situated in narratives that I am portraying. The worthiness of overall autoethnographic presentation perhaps lies in the originality of narratives or data texts grounded in the subjects of research (research participants and contexts), the linkage of these data based on narratives and stories to the

lifeworld of people, and the presence of instances that connects mind and body including the heart. As I am doing autoethnographic inquiry, this appears to be more authentic to represent the voice of the insider thereby connecting the context of the outsider (a culture) (Reed-Danahay, 1997). Here, I discuss the quality standards that I ensure throughout this research and how they are pertinent to this inquiry.

Verisimilitude

Whilst reading and listening to some of the other's stories and narratives, I become thoughtful and mindful in linking them with my living world. Sometimes, I try to be an actor in the presented narratives as if they were written for me. I try to imitate the dialogues and creatively imagine the scenes. This happens when the narratives have an element of verisimilitude or when the author(s) has/have integrated lifelikeness in their stories and narratives. Something similar happens when it comes to the world of postmodern arts-based research. Simplifying the terms verisimilitude, it is likely to be similar to the life of people or lifelikeness or believable.

To a great degree, it encompasses the meaning of being very similar, true, or real. The term at first was coined by Karl Popper (1902 – 1994) in the philosophy of science. However, it has been spread in qualitative inquiry. It is used as a criterion (others include plausibility, internal coherence, and correspondence to readers' own experience) which is important for judging narrative inquiry, as a criterion for making judgments about the evocative power of authenticity of a textual representation and as the relationship of a particular text to some agreed-on standards of a particular interpretive community (Schwandt, 2014). In the context of postmodernism, I maintained various genres (discussed in the above section) of writing to present the analysis. This may help my readers to have more connection of their lifeworlds with the context I presented in my study.

In the case of autoethnography, Ellis (2004) argued that the autoethnographic text achieves the quality of verisimilitude as they evoke a feeling that the experience described is lifelike, believable, and seemingly possible. This refers to readers' inquisitiveness to inquire questions and make possible doubts in order for them to engage throughout the stories. The degree of connectedness to evoke my readers to engage with my narratives and to be an actor in the presented stories, I provided intense description (in a more evocative and emotional form) of my experiences thereby including a thorough description of the plots, contexts, people, and even involved in my stories, vignettes, and conversations so as to make narratives as real as they were (please consider reading chapters III, IV, V, and VI). Throughout my narrative presentation, I happened to speak in multiple voices to my stories making them more engaging, interesting, illuminating, and evocative to the readers (Pant, 2015). In this process, I offered sufficient space for readers to relate these narratives to their own experiences and interact with their lifeworlds.

Transferability

Transferability appears to be parallel to internal validity in post positivistic research studies (Bryman, 2016) and it is the usefulness of the research in similar other contexts or scenarios. This is one of the four criteria such as credibility, transferability, dependability, and confirmability in qualitative research. This is a quality standard of the findings of a research inquiry which might be applicable, to a greater degree, to another situation if the research studies are done using a similar methodology. In the case of autoethnographic studies, the presented narratives might have the characteristics to evoke readers to adopt the findings in similar other contexts. So, the usefulness of these narratives can be helpful to understand the other similar context (Ellis, 2004).

In the case of my research, I have used stories, vignettes, and conversations of my lived experiences to evoke the readers (you) to think/apply the usefulness of the findings in

similar other contexts (you might find the implications of this research inquiry in your personal and professional contexts). In doing so, I tried to ensure feasibility or viability while presenting the discussions throughout this inquiry and tried to be as much practical as I could. I have ensured that the people such as learners, teachers, teacher educators, and other stakeholders who are interacted with my research, will find the usefulness of the inquiry, I have presented, in their personal and professional contexts

Pedagogical Thoughtfulness

When I interacted with this term, pedagogical thoughtfulness, oftentimes, I started becoming more thoughtful about the usefulness of my research in the context of teaching and learning. While doing so, I needed to be critically reflective upon my beliefs, values, and practices of teaching and learning that makes me pedagogically thoughtful (Van Manen, 1991, 2016). When people (learners, teachers, teacher educators, etc.) do this, they are empowered to be aware of the practices that lead them for pedagogical transformation. Pedagogical thoughtfulness is about increasing the likelihood of teachers and teacher educators becoming aware of the deep-seated assumptions which guide their beliefs and practices (Luitel, 2009). So, my standpoint in this research is to make readers think and reflect critically on their beliefs and values to be aware of their practices.

Thus, I value that the agenda of every educational research should be making people aware in the field of education. Therefore, I ensure the quality of being pedagogically thoughtful throughout this research with my lived experiences constituting the values, beliefs, and assumptions from the broader spectrum of education. Moreover, through this research, I aim that education leaders should be the agents of change (Luitel & Taylor, 2019; Pant, 2019). To ensure pedagogical thoughtfulness, I presented multiple forms of genres and

arts-based representations (pictures, models, etc.) concerning my academic and non-academic worlds so that readers can connect their lifeworlds better and be pedagogically thoughtful. Moreover, I tried to include some evocative, thoughtful, and thought-provoking questions that might be helpful for you (readers) to think and make critical self-reflection which might result empowering actions.

Critical Reflexivity

I have used criticalism in doing this inquiry which provided me to critically think upon, raise questions against, and reflect upon my and others' cherished values, beliefs, and practices. The taken-for-granted practices, assumptions, hegemonic traditions, and socially and politically exaggerated ideologies seem to promote disempowerment. By doing so, I ensure that readers and I become aware of these things thereby practicing empowerment in our context. This is also about transforming the practices for empowerment and emancipation. Reflexivity is 'an ability to notice our responses to the world around us, other people and events, and to use that knowledge to inform our actions, communications and understandings' (Etherington, 2004, p. 19). When we include the critical component in this, we can see our actions through critical perspectives.

Being critically reflective means having the consciousness about what/how/why we did/do those practices and make a change in the future attempts being critically aware and by realizing how we/I can improve our practices (Whitehead, 2008). In this, critical reflection is a fundamental thing to being a reflective practitioner. In this research study, I ensure that critical reflections on my unfolding experiences and practices make me and my readers aware of moving towards inclusive and holistic practices. Here, I am guided by Brookfield's (1999, as cited in Pant, 2015) concept of three different phases of critical reflection. First, I identified those embedded assumptions. Second, I assessed those assumptions regarding my practices. Finally, I developed and envisaged more empowering assumptions (note: you can

identify these throughout this research inquiry). In this way, I ensured the quality standard adopting critical reflexivity in my research.

Being Ethically Sound

Doing research, in the present context, is being explicitly sensitive in terms of addressing and maintaining ethical concerns whilst carrying out the research inquiry. More conscious and deliberate actions concerning the ethics of research are essential from the beginning to the end of any research study (Mertens, 2012). So are with autoethnographic inquiries. In the process of doing this ethically sound autoethnographic inquiry, I should be aware of some ethical guidelines. These guidelines are potentially imperative for me to address and maintain ethical issues of research. Here, I am going to discuss the ethics of research that I maintained in this scholarly work.

- **Non-maleficence:** As an autoethnographer, my personal stories, vignettes, and anecdotes have entailed diverse people and places. These embodied characters played an immense role in this research inquiry. Thus, I treated and respect them equally without doing harm and by preventing them from harm (Tullis, 2016) to solve the issues regarding maleficence in the research. In my narratives, there are people and contexts. So, I was aware of getting consent to mention these things in this inquiry. In this case, if required, I took their consent to keep the information in the process of writing, and I even tried to use the pseudo names of the people and contexts to ensure the anonymity for protecting identity and confidentiality. In the requirement of real-world context, with consent, I tried to use the original contexts accordingly.
- **Beneficence:** Throughout this research study, I presented my personal stories interconnected to my culture(s) with the central focus on empowering people to transform their thoughts and actions. On top of that, the major benefits of this autoethnographic venture comprised of helping myself, research participants, and the audience to transform

their lives; and valuing of relational ethics (my responsibility towards my culture I study) (Adams & Ellis, 2012). Throughout this journey, I was very much conscious about the maximum benefits of this inquiry to the people and community associated with it. This is equivalent to addressing the emerging ethic of research: beneficence. Mertens (2012) discussed that the principle of beneficence emphasizes on making a great effort by researchers 'to maximize the good outcomes for science and humanity and minimize risk or harm to individuals in the research' (p. 22).

- **Responsibility:** I take this journey as an endeavor of a responsible learner, teacher, teacher educator, research practitioner, and most importantly, a responsible human being. I have grown up with my culture (including education) so I have some responsibilities to return them something. I have grown up experiencing unjust practices. So, I started this journey to work against such unjust practices thereby aspiring to work for an inclusive and transformative world.
- **Solidarity:** I believe in the 'together we can' essence of collaboration for transformation. On top of that, the change begins with 'I'. In this regard, I am telling my living stories that might verisimilitude with the stories of you (readers) possibly to acquire power for transformation. I think that my story could be one of the critical moments for others to empower them to unfold their stories of having immense significance for transforming their (including self) thoughts and action. Keeping this notion of solidarity in mind, I tried to uncover only those stories for evocating readers to join this journey of transformation.
- **Humility:** In this entire inquiry, I am not claiming that everything I discussed is final. To put it simply, I am not here to claim this or that. However, I brought forth my lived world through the lens of perspectivism assuming that there is no such *'eidos'*. I used perspectival and dialectical ways of expressions to discuss every single thing that I presented in this inquiry. The emerging findings were my personal standpoints or perspectives from the

present and critical vantage points. Still, they did not mean the final. Moreover, the other sources I used (literature, theories, perspectives, etc.) are supportive for my interpretation and generation of meanings. By this, I mean that these perspectives of the sources I used do not seek the generalizability in this inquiry rather they seek the connections. So, I have ensured the notion of humility throughout this research inquiry by enjoying in perspectival methods of writing.

This research project depicts my lived experiences in various contexts. Through narratives, I have written my epiphanies, my lived experiences, and my stories. In this regard, I am both an author and a player. Whilst writing these narratives, I was extremely aware with my roles and their consequences in the process of unfolding my lived experiences. More so, I attempted to reject the most occurring ethical issues in autoethnographic studies such as being self-centric, selfish, and narcissist. For this, I tried to situate and confine my lived experiences around my academic and non-academic worlds. These narratives might speak the original voice drawn from my lived experiences. Moreover, for maintaining the ethical issue in this research, I tried to be more inclusive. Following these guidelines during my journey of doing this inquiry, I believe that this property is ethically sound by addressing the emerging issues of ethics. Therefore, I represent one of those communities that believes in quality and ethically sound research.

Reflecting on the Overall Chapter

Crafting my research inquiry with the help of a research methodology was an extremely challenging journey I voyaged. Through this, I might have been capable of giving justice to my lived and living narratives that cover me, my culture, and my visions. Therefore, this chapter is an emergent path I created to travel my journey of conducting this inquiry. In the beginning, I discussed three guiding philosophical worldviews – value-laden axiology, relativist ontology, and constructivist epistemology that guide this inquiry. Under

the multi-paradigmatic research design space, criticalism, postmodernism, and interpretivism were the research paradigms under which this inquiry stems. I articulated criticalism as an empowering paradigm in this inquiry to observe every event through critical lens and they enabled me to raise the critical voices against my and other's practices to design an inclusive, equitable, and empowering vision of education. I discussed the postmodernism paradigm to present my narratives and stories by using multiple arts-based genres so that people better make sense of the research texts. I discussed Interpretivism as an essential paradigm that provided me with sufficient space for wearing my culture's lens to understand, analyze, and interpret the meaning embedded in my academic and non-academic lifeworlds. Based on the nature of this inquiry, I articulated autoethnography as a research methodology to conduct this inquiry as a result I was able to bind myself and my culture through this inquiry. Similarly, I discussed my process of narrative generation and the basis of narrative generation. I discussed the multiple logics and genres such as dialectical, metaphorical, narrative, and non-linguistic genres which I have used in my inquiry to minimize the domination and over-influenced of hypothetico-deductive system which has the primacy of the use of liner, dualistic, and prescriptive modes of thinking and representation. Next, I created the timeline and sources of the data I generated throughout this research study. I discussed the quality standards of this inquiry – verisimilitude for lifelikeness, transferability for the usefulness of research in the similar contexts, pedagogical thoughtfulness for making people thoughtful and critically reflective on their pedagogical practices, and critical reflexivity for making people and myself conscious through critical reflection and critical self-reflection. Finally, I discussed some of the emerging ethical practices of the research that I maintained to avoid the unethical traits that harm me and my community of practice.

CHAPTER III

CRAFTING MY ACADEMIC JOURNEY: REVEALING CONVENTIONALITY

Chapter Overview

In chapter I, I situated this inquiry by discussing some emerging problems in the field of mathematics/STEM education and developed the purpose and research questions to search the solutions to the existing problems based on my lived experiences in the academic and non-academic worlds. I discussed three theories: living educational theory, theory of transformative learning, and Habermas' knowledge constitutive interests and some other crucial concepts (holistic education, research as transformative learning, and research as envisioning) using them as referents in this inquiry. So, this chapter was both the initiation and driving chapter of this entire inquiry. Next, I developed chapter II to discuss the methodology of this research venture. In this, I discussed my guiding worldviews and paradigms, autoethnography as a research methodology, the process of narrative generation, sources of data/narratives, multiple logics and genres used throughout this research, quality standards, and finally some ethical standpoints of my inquiry. Now, my next job is to go for a thorough interpretation of data and meaning un/making process so that I can address the emergent questions of this research endeavor.

This chapter is specially designed to address the first research question: In what ways had my academic journey from school to under graduation shaped my identity as a conventional/traditional learner and teacher? I developed several themes for the thematic discussions and meaning-making procedures such as 'A *Spoon-fed Pedagogy: The Initiation of System of Domination, 'Mistakes are Crimes or Sins: You Should not Make Mistakes', 'This is not Your Arts Class', 'Guidebook: Solution to Every Problem', 'Copying Pasting*

Pedagogy', 'Waiter Pedagogy: A Knowledge Transmitter', and eventually 'Examination: A Race'. To address the aforementioned research question, I depicted my experiences as a learner from school to undergraduate degree and sometimes as a teacher thereby discussing what/how these experiences were aligned with, from my present critical vantage points, promoting disempowering and discouraging educational practices.

A Spoon-fed Pedagogy: The Initiation of System of Domination

At the age of seven, I was enrolled in a nearby primary school named 'Development Primary School'. I started my formal educational journey from this community school. My beginning of school days was fabulous. I enjoyed going to school with my friends, playing various local games, and sharing happiness and sorrows. I still remember, the school was made up of stones, clay, and tins on the roof which possibly gives a picture of a traditional government/public school in a remote area. Nearby the school, there was a forest. From the school, I could feel and hear the voices of several animals, birds, and several sounds of wind when it touches the branches of trees. There were wooden-made benches and desks for students to sit and to keep our books and bags. There used to be one blackboard on each classroom's wall; one chair and a table for teachers in one corner of the classroom; and usually a long thick stick probably to control students in another corner. Reflecting on it through my constructivist vantage points, the classroom was similar to a traditionally designed classroom where a teacher used to stand in front of us, near the blackboard or sit on the chair while delivering the content knowledge. There was a playground (ground available in the remote village) for students to play games.

It could be the middle of June 1998. I was in grade one. I was in my initial days of schooling. Initial school days are worth remembering. However, few of those experiences have left marks in the brain and the heart. Of several incidents, I am going to delve into one which is still in my memory. From the very first day of my schooling, I interacted with

coursebooks provided by the school. I perhaps had three or four books of separate subjects. There were three different teachers for teaching those subjects such as 'My Mathematics', 'My Nepali' etc. One day and during the class period of mathematics, one of the lady teachers, Sumina Miss, entered the classroom. I still remember that the lady teacher had written a title '१ देखि १० सम्मका सँख्याहरु' (number from one to 10) in the blackboard and beneath this, she wrote the numerals from 1 to 10. The following conversation between teacher and students would give a glimpse of the classroom practices of my schooling time.

Sumina Miss: *Dear Children!*

Students: *Yes! Miss.*

Sumina Miss: (Showing in the blackboard with the help of a long thick stick) *Can you see the numbers?*

Students: *Yes miss! We can see what you have just written* (I know, most of my friends were not familiar with numbers as they had not interacted with the literal versions of numbers before. Most of these fellows seemed to be following other's voices. However, I could see the numbers on the board).

Sumina Miss: *Now, I am reading these numbers from one and you have to repeat after me? Did you understand?* (She repeatedly said the same thing for two or three more times)

Students: Sure, miss (some of us haphazardly made a loud voice).

Sumina Miss: (by showing '1') *Say, One!*

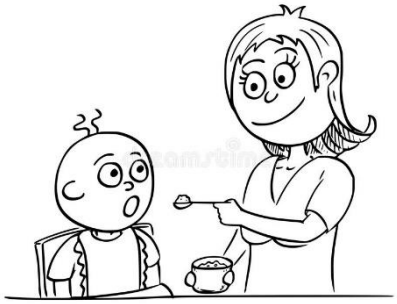
Students: *One!* (I dictated the numeral loudly because I was aware of the numbers from one to a hundred or more before joining this school)

Sumina Miss: (Showing the number 2) *Two!*

Students: *Two!*

……

In the same way, Sumina miss spelled out the numerals and we repeated the same after her. Moreover, she wrote the numbers from 20 to 30 on the other day and used the same method of reading the numbers, by hook or crook we followed her. At last, she would say, *"Dear students! Now, your job is to read the numbers one to twenty at your home. Repeat the process again and again. Tomorrow, you all will tell me those numbers. Okay!"* The childlike mind could not think much so, we all agreed by saying, *'Sure Miss'.* I came home and repeatedly read those numbers.



In this way, I happened to memorize and store numbers, letters of Nepali language 'क', 'ख', …., 'ज्ञ', letters of English alphabet 'a', 'b', …, 'z', songs or poems 'तारा बाजी लै लै, ….', and other poems and songs by repeating them again and again. Additionally, I had to write the letters and words as per the standard rules by following the footsteps of my teachers as I was not allowed to write whatever I liked. It seems that I was habituated in following teachers' step-by-step instruction, doing drills, and developing a habit of memorization to recall the information as objective truths without questioning leading to the reproduction of knowledge. As I reflect on those classes now, those classes did not have playing materials and manipulatives in the process of the construction of knowledge. Oftentimes, teachers used to say, *"OK! Students. Do what I said. These are the important things for your upcoming examination, for the next grade (level), for your future. You have to practice a lot to learn. So, practice makes you perfect."*

Arriving at this stage, I have realized that my teachers probably were spoon-feeding us assuming that children come to the school with an empty brain and non-academic

experiences similar to what one of the empiricists John Locke called blank slate or *tabula rasa*, and eventually, the teachers' role thereby remains to fill it with knowledge, attitudes, and wisdom without considering the diverse need, abilities, background, and level of students. The spoon-feeding pedagogy appears to be the product of the banking concept of pedagogy as discussed by Freire (1993) in which students are the depositories and the teacher is the depositor. Such pedagogy is similar to a highly teacher-centered approach to education as a result students' job extends to receiving, filing, and storing the deposits (knowledge) for the future. In my experience, instead of engaging in child-centered classroom settings, the practices of school from early grades were seemingly opposite to what I experienced in my non-academic worlds wherein I had humongous opportunities to look, observe, investigate, and play with the models or representations. I have done a detailed discussion concerning my non-academic lifeworld in chapter IV.

Although the practice was good for storing the information to some extent, I travelled a painful journey spending hours and hours for the memorization. According to the perspectives of child psychology and learning theories like cognitivism and constructivism, children are likely to need concrete materials to have the meaningful conceptual construction of knowledge (Canobi, 2009; Manandhar, 2018). The instructional materials are essential to physically interact with those materials to construct mathematical knowledge. I agree with Piaget's cognitive learning theory that claims that children in pre-operational and concrete operational stages need manipulatives in the form of objects to develop the foundation of knowledge (Ojose, 2008). Particularly, the early age of learning mathematics needs materials such as stones, marbles, cubes, etc. to play with them and learn to develop a meaningful

schema. At least, the teacher can allow students to go outside the classroom and explore ideas through observation and investigation by interacting with nature or physical worlds beyond the four walls of the school. Based on my practical vantage points, these things had not been practiced by my teachers but I had experiences of playing several local and other games while being in the school time – they were, I think, not connected.

My forgoing discussion may represent that spoon-feeding pedagogy, jug-mug pedagogy, or whatever we call relating to teacher-centered and transmissionist pedagogies depending upon lecture methods seem to be grounded in our school education starting from very early grades. By expressing this, I do not deny the positive aspects of these methodologies in learning. In this regard, I am respectful to those teachers and educational institutions who were/are using child-friendly methodologies such as Montessori in early grades for the all-round development of a child. However, such practices seem to be limited to early grades as ERO (2018) claims that there is a huge gap between the performances of students of early grades and upper primary grades in literacy and numeracy. One fundamental reason behind this might be that we start converging towards 'back to basic' or teacher-led instructional strategies once again and for all. As per my observation, the tradition seems to continue until students finish their education.

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Mistakes are Crimes: You Should not Make Mistakes!

My learning journey of mathematics and other subjects in upper primary and lower secondary grades (grades 6, 7, and 8) might represent how stimulus-response or punishment-response bonding, possibly characterized by behaviorist theory of learning, forced me to develop my skills of rote memorization of the information kept in the textbooks, guidebooks or teachers' notes and routine problem-solving. There were several events in which my teachers would become authoritarian and dictator to employ teaching strategies by treating

students as if they are animals and considering making mistakes as committing crimes or sins. Here, I have tried to unfold some prevailing incidents that might represent the nature of an authoritarian teacher.

My journey in upper primary grades (grades 3, 4, and 5) went through the sufferings such as punishments and teachers' cruelty that possibly engendered psychological fear and physical pain among students. You (reader) might have also experienced similar contexts as a student or a teacher. *How do you interpret those fears and pains?* In my case, there was a teacher (a tall masculine with a giant and terrible face) who used to teach us mathematics, English, and science-related subjects. He used to come to school drunk and beat the academically poor or the students who could not memorize the contents. Every child including me would be afraid of him. I was punished several times by this teacher because of making mistakes while learning. Due to such a nature of the teacher, I was afraid of going to school and attending his classes. However, I did not have other options. Here, I would like to reflect on one incident depicting the nature of the teacher and its impact on the young learners.

It could be any day in summer 2001. I was in grade four. We were 13 students altogether inside the classroom. I could feel an immense heat inside the classroom because the season was summer, and the heat generated by the tin used on the roof of the school. Suddenly, the teacher Mr. Shree entered the classroom. As soon as he entered the class, we greeted him, and he started his same old job. The conversation would proceed in the following way.

Mr. Shree: (With his averaged drunk utterance) *Are you living or dead? Are you fine?*

Students: (quickly) *yes, Sir.*

Mr. Shree: *Okay. Turn the page number …. of your 'My Mathematics Book'.*

(I put the book on the desk and open the suggested page, others would do the same)

Mr. Shree: *Alright! We are starting a new chapter 'Geometry' today. Now, I want you to read the first two pages in which you can find the definition of solid objects, the number of their faces, and edges. Try to memorize the major points highlighted. You have 15 minutes to read. After this, I will ask you some questions one by one.*

Students: (innocently seeing at each other's face) *Okay, Sir.*

(The teacher went outside. We then started reading the information given in the textbook. I tried my best to rote memorize as much as I could. I had to save myself from Mr. Shree's painful punishments. I read the highlighted portions many times for the complete memorization. My other friends, usually, did the same. Unexpectedly, time was over. The teacher came in.)

Mr. Shree: *Are you done? Have you finished reading and memorizing?*

Students: (Some of us, with innocent voices) *Yes, Sir. We are done.*

Mr. Shree: *Okay. Now, I ask you questions one by one. First, Niru, your turn.*

(When Mr. Shree was asking questions to other friends, I was inaudibly remembering and mugging up as much as I could. After some time, my turn came. Thank God, I could recite the information accurately. Once again, I was able to save myself.)

(It was the turn of my friend Mr. Prayas. He was known to be weak in mathematics and English because of his below-average performances in the previous examinations and his weak ability of memorization.)

Mr. Shree: *Mr. Prayas, tell me how many edges does cylinder have?*

(Mr. Prayas could not make it. He could not memorize and give the answer. He might be looking here and there with a frightened face. I could see him regretful for being not able to memorize. He was mumbling, 'one, …., no-no, …., two, ……'.)

Mr. Shree: *You rascal, scoundrel, poor fellow. How could you not even memorize this much information? How will you survive in this world with such performance? Go and look after*

goats, oxen, cows, etc. Go and do household work. You can do nothing in the future. Your father and grandfathers could do nothing good. You are also on the same line. Go 'Kathmandu' (the capital city of Nepal) to carry sacks with cement or wash utensils in hotels or restaurants. You are nothing. Your future is finished.

(Mr. Shree slapped Prayas on both cheeks and told a girl named Rina to bring a stick. Rina went out to bring a stick. Rina was also afraid. She brought whatever she found nearby the school. She came with a very long and thick stick.)

Mr. Shree: *Show me your hands.*

Mr. Shree beat Prayas with that long stick on various parts of his body. He shattered him even on his head. Unfortunately, Prayas' head got injured. It started bleeding. A huge amount of blood was coming down from his head. I was even frightened so much. The whole classroom was so terrified. But the teacher seemed still angry. Finally, he called a female teacher to bring a first aid kit. The female teacher came and put some medicines and bandaged it to prevent blood from the wound. By then, the class time was over. The very next day, some of the guardians came to the school and complained, but they could not do anything because Mr. Shree was the headteacher at that school. Arriving at this moment of this inquiry, as I reflect on the incident, I raise some of the questions like*; how could he be so cruel and inhuman? Could such a person be a human being? Did you see the difference between him and other deadly animals? Was that behavior the quality of the teacher? What should be the nature of the student-teacher relationship? Do students trust you in such a situation?* Numerous questions are capturing my mind. However, in such a fearful situation, I invested most of my time to save myself from the cruel and inhuman behavior of the teacher.

Figure 6. Teacher inhumanly beating students

My journey in middle grades (lower secondary grades) went through similar phenomena. This time, the teacher who taught us mathematics had a unique rule to punish his pupils. He used to give students several difficult routine problems as homework by copying from exercise books or other practice books. The next day, he used to check the solutions one by one. If there was any wrong solution or a wrong step, the respective student would get one stick. I mean, one wrong solution = one stick. He would bring a thick and long stick with him. Solving rote problems in algorithmic procedures was the tradition because the teacher would focus on the rightness of every step which led to procedural knowledge (Rittle-Johnson & Schneider, 2015). Arriving at this point of inquiry, being aware of progressive methods of teaching (e.g.,, inquiry-based learning), ethics and responsibilities of teacher, I feel that this could be another pathetic situation of my teacher who was following approaches led by behaviorism theory of learning by using punishment-response or stimulus-response ideology of knowledge reproduction. By controlling the learning environment because students did not get the opportunities to discuss, communicate, share, question, and explore the world beyond the four walls of the classroom, and the teachers seemed to follow (still following) technical rationality (Habermas, 1986) in the name of educating people.

Of numerous episodes, these two were the representative incidents I experienced and suffered the most as a learner. My secondary education went through similar phenomena. I spent most of my time recalling, memorizing by repeating time and again, following 'practice makes a man perfect' strategies, and emphasizing on the most important questions for examination – test-driven pedagogy by reducing the possibility of making mistakes because of overly emphasized and so-called iron gate SLC examination and other high-stake examination.

I also experienced the practices of competition rather than collaboration. From my present vantage point, I do not remember any such phenomena in which my teachers used

any collaborative approach to discuss and share the ideas; allowed us to ask questions beyond the course of contents, if asked, I was told you-will-learn-in-the-future (Luitel, 2009) statements. Writing definitions, formulas, tricks, etc. on the chart papers and pasting them on the wall of the classroom usually used to be my project works. I was taking a learning journey as a race and life as a game in which the only one can win, and others are the failures. So, I always tried to be the first in every grade. The pedagogical practices could encourage me to believe that there is only one right answer. So, I perceived that wrong answers are the product of failures and mistakes are the sins. Taking learning as a competition seemed to be encouraging the practice of rewarding the students who could notice the wrong answers of my peers. This environment probably influenced me to develop a thought that mistakes are sins or crimes because it was considered, propositionally that if mistakes are made, I would be punished. Because of this very reason, I could score good marks, get admiration from my teachers and parents, and consequently, I became egoistic and narcissistic. But *did I develop good values or attributes?*

Arriving at this moment, I raise some critical questions. *Can anybody progress without making mistakes or observing people making mistakes? Can students cultivate alternative ideas and thoughts without making mistakes?* There is widespread consensus in education that people (children) learn from their mistakes and mistakes are incredible learning opportunities and sources of understanding (Hattie, 2012). If so, *why do not accept mistakes and failures, sometimes? Are punishments required? Is punishing students an ultimate solution for improving their academic performance? What about the child and human rights?* Besides punishments, *what could be the alternative strategies to make students learn from their mistakes?* In the midst of these questions, it has been some years people take punishments negatively. Knowing the negative impacts of punishments, academic sectors have already started implementing some progressive methodologies to

reduce the domination of behavioristic learning theory. Some legal acts have also been formulated which strictly ban or restrict the practice of giving punishments. Now, giving punishment is committing a crime. Hence, it can be said that these are some rays of hope for improving education.

I consider that it is better we acknowledge the mistakes made by students and establish a system so that students become aware of making mistakes and learn from them. For this, we need to design an empowering educational practice for this pedagogical transformation. The frequent and constructive feedback given by teachers could be helpful for students' progress in learning. While doing so, students could reflect on their learning experiences as a result they could improve subsequent learning. Similarly, some formative assessment practices such as self- and peer-assessments might be crucial for students to learn from their own mistakes. For the teachers and the whole education system, the critical reflection upon mistakes might be excellent practice for improving the ongoing practices.

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This is not Your Arts Class

Me: *Sir, why can't I paint in mathematics? Why can't I sing mathematics? How can I dance our mathematics? Can I write a poem on this concept? Sir, please tell us the stories of mathematics, science, ...*

Teacher of mathematics or science: *What nonsense? Is this your literature class? Is this your language subject? Is this your social study subject? No! This means you are not allowed to do such things in this period. These are the tasks of students who want to be artists. These are not important for a student who wants to be a great person in his/her life by studying mathematics and science. Read, memorize, and solve the questions given in the textbooks and practice books, in a cyclic process. Keep in the mind that 'only the practice makes you*

perfect'. Your marks in mathematics and science are decreasing. So, you need to practice more and more.

This conversation can be one of the representative incidents in my learning journey as a student. Situating this discussion as an arts-lover, I was surrounded by a family and relatives who were/are considered to be good at singing and dancing. In cultural programs, my family used to get and/or provide entertainment through such arts activities. I had been witnessing those activities since my birth. Later, I also joined them and started to play the Madal and the harmonium, perform dance, and sing songs. My involvement in brick factories had also provided plentiful opportunities to watch Nepali movies every week or every month. These activities could be powerful to develop my interest in arts-related fields such as singing, dancing, among others. However, meanwhile, I also faced difficulties in managing schools, household works, works in brick factories, and my interest in an arts-related field. These contexts seemed to be segregated as if they had no connections. Arriving here as I reflect on them, I realize that arts have greater value in education but in some so-called difficult subjects particularly mathematics and science, I could not experience songs, poems, dance, paintings, etc. Mathematics and science were my favorite subjects at the school level. However, I was unable to link my interest in arts and learning contexts of these subjects.

There used to be limited/no pictures in the textbook of mathematics. Even though there were some pictures, they would be black and white, blur, vague, or obscure to make sense of the ideas. This applies to other textbooks, especially the textbooks provided by the government. As a requirement of educational programs of 10+2 and bachelor in Nepal, everyone-to-be-teacher needs to analyze the nature of one textbook of any grade. I analyzed the textbook of grade nine mathematics and went through other's reports. I found one similar conclusion: a rare number and poor quality of pictures. It is accepted that a single picture speaks thousands of words. So, this might be one of the problems of our education system

behind not valuing the visual arts. Nevertheless, present textbooks and resource materials have started including pictures with better quality which I take as consciousness towards the value of arts in learning.

I have experienced that people ignore drawing pictures while solving problems of mathematics. If we draw pictures, we may be habituated in drawing some standard figures as if other forms do not exist. For instance, I got an opportunity that might be at the beginning of 2016, to participate in a workshop session facilitated by one of the educators from Kathmandu University. He said*, "Dear friends, let's do a warmup activity. I want you to open up your notebook and take a pen. In a blank paper of your notebook, draw a triangle. You have just 30 seconds."* We did accordingly. As soon as we finished drawing, the facilitator observed the drawing of each participant. Meanwhile, he was smiling and throwing a peculiar look to every drawing. Sometime later, he perhaps said in this way: *"Thank you so much for your active participation. I really enjoyed it and liked what you drew. However, I am surprised that every one of you drew a similar triangle – having one vertex up and remaining down.* (He drew a similar figure of the triangle that we had recently drawn in our notebook). *Is it a standard figure of a triangle? Can't we draw other forms of the triangle or can't we change the position of the triangle? In other workshops and teacher training, I observed a similar context. Most of you are teaching at school and high schools. Have you ever imagined that the figure you and your students draw may affect the creativity of thinking alternatively or divergent thinking?"* I was surprised by listening to it. There, I realized that I was habituated to draw standard figures and shapes. I applied this context in my teaching to the high schools and bachelor level students. They ended up drawing similar figures of triangles, quadrilaterals, and so on.

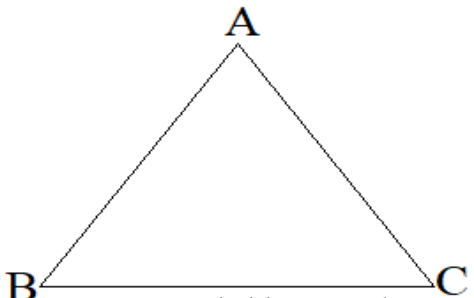

Figure 7. Probably we end up drawing this type of triangle 99 times out of 100

Oh! my goodness. Even textbooks seem to have similar figures and shapes. As I reflect on it now, I realize that we are actually under the domination of some standard process or algorithms of doing things. We probably blindly follow them. In this, I would say vulnerable context, *how can students develop their novel thinking skills? What are the alternatives that harness the creativity of students? Can arts be helpful to prosper this skill?* At this vantage point, I conclude that our education system, as far as the present model of education is concerned, might not be able to address the aforementioned issues.

In my school days, I used to write about my pains and sufferings through poems and stories. I had, one point in time, a huge interest in this field. Writing about my pain, emotions, and feelings through poems and stories was my passion. My life, filled with difficulties and hardships, possibly induced me to express the experiences of my life. In this context, I usually used to write diaries, the autobiography, etc. But things got changed with one unexpected incident in the school. It might be any day in August of 2005, in the regular mathematics period of grade seven, the teacher had given some problems to solve, but I wanted to finish my poem which I had already started the day before. Without solving those given questions, I immersed myself in creating some verses. Mr. teacher secretly came to me and started to stare at my work, but I did not notice that. He then hit me on my head with his duster. I suddenly stood up as if I woke up from an extremely scary dream. He then slapped

me and pulled my hair here and there. I still remember what he did and said to me. He shouted at me, *"You scoundrel! I have given you some problems to solve and you are doing this nonsense. You are the second boy in this class but instead of doing mathematics*

problems, you are doing this ridiculous job. How can you score 90+ in the final examination and SLC, if you are spending your time on these meaningless things? You are good at mathematics and science. So, focus on solving difficult problems. I warn you, from now on, you must stop doing these nonsenses." I was speechless. I could not even bring tears to my eyes. I was just standing shamelessly – frightened, having no sense of my own existence. I did not see that even my friends were also glaring at me. I was hopeless as if I were not standing on the ground. After this moment, I decided to stop writing poems so that I could prioritize mathematics and science more.

This could be one among numerous leading examples where students are forced to abandon their creativity and arts-based abilities in the name of doing good in mathematics and science and developing analytical thinking skills associated with the skills of the left hemisphere of the brain (Robinson, 2017). Mishra and Henriksen (2018) also asserted that schooling seems to be the most effective means to suppress creativity and intelligence in modern days. I confess that the ignorance of arts lacks the interest of the student in learning. Arriving at this stage of inquiry, I would like to raise some fundamental questions. *Why is such a situation prevalent in mathematics and science pedagogy? Can we not integrate our artistic abilities in studying these so-called difficult subjects? What are the different forms of arts that can be integrated? What are the benefits of remixing arts and education? What are the values of arts in education (arts, design, and humanity)?*

In the deep inside my heart, I feel that school killed my artistic abilities and delimited myself to the academic successes in terms of gathering certificates. These practices appeared to ignore the development of skills (can be cultivated by arts) by saying unrelated and unimportant parts of human lives. I could achieve outstanding marks in the finals. I used to be

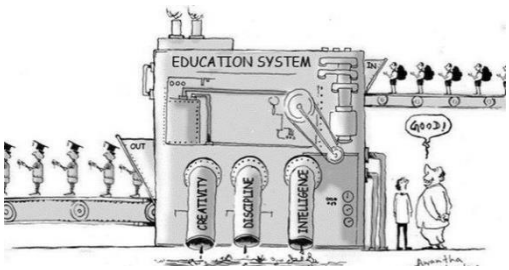

Figure 8. Present education system

praised by my teachers because of my performance in the most important subjects. Like me, there were my friends who wanted to become a movie star, a comedian, a dramatist, a director, a singer, a writer, a painter, etc. But the sad story is that none of them involved in any one of the arts fields and unfortunately, most of them could not complete school or 10+2 level education (any day, in a personal conversation with friends on social media). Here, school seemed and seems to be segregating education from arts-related fields. For instance, the school used to rarely organize debate programs, quiz contexts, and sometimes cultural programs focusing on performative arts.

Accepting 'arts are out there', my educational journey till bachelor's level went through the similar context of ignoring arts because I did not extensively see their relevance in my learning context. This could be a crucial time for me to flourish in arts-related fields or I might use arts to cultivate higher-order thinking skills including creativity and imagination (see chapter IV for a detailed discussion regarding the importance of arts integration). More so, my involvement in various ICT platforms could be helpful to integrate arts in learning. So far I could remember, teachers did not use various arts forms to present the contents and create rich contexts of learning.

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Guidebook: Solution to Every Problem!

What is the source of knowledge? Where/how do I find knowledge? Are textbooks, teachers, or guidebooks the ultimate sources of knowledge? Is knowledge located somewhere in the teacher's head? Is knowledge invented or discovered? These are some recurrent epistemological questions I experienced in my master's degree in mathematics education and my teaching and learning contexts.

In my school education, I had to go to a brick factory for six months every year. There were no facilities and opportunities of going to school to get an education because this is the

field for poor people to earn money for their survival. So, children like me were/are deprived of getting and/or continuing their education. This phenomenon was a hindrance for me to continue my formal education. However, facing such extreme difficulties, I had to manage time to do self-study while doing work in those brick factories. During this adverse situation, I used to study the so-called most difficult subjects. Learning without the support of more knowing others (MKO) like teachers can be impossible when a child/person is not good at self-regulated study or s/he does not get sufficient materials. For me, managing supportive materials for my self-study was difficult or impossible. In this context, I would buy the guidebooks. I would try to solve the problems of textbooks with the help of guidebooks. When I interacted with any questions given in the textbooks, I used to look up the solution in the guidebook, copy as it is, and do it several times until I confidently remember the entire process. At that time, I used to conceive that a guidebook is made by geniuses, it has solutions to all the problems, and it is an ultimate source of knowledge.

After the completion of school education in 2009, I decided to continue my 10+2 (grade 11 and 12) in mathematics education. For this, I went to the district headquarter (Manthali) far from my village to continue my higher education. Because of having a good volume of accumulated knowledge in mathematics characterized by more procedural skills (how to solve problems rather than why to learn concepts) and getting above 90 out of 100 in mathematics encouraged me to take mathematics as a major subject. Procedural knowledge refers to knowledge that sounds like a toolbox that includes facts, skills, procedures, algorithms, or methods used to solve a problem (Barr et al., 2003; Rittle-Johnson, 2019). The context of learning and doing mathematics in IEd comprised a set of skills of primarily focusing on looking up in the several guidebooks to get the solutions done. So, I could

develop a perception that textbooks are the collections of routine questions and guidebooks are the solutions to all those questions.

It could be any day in September 2009 – the first day in a new college located in the headquarter. All my classmates were new to me. Later, we introduced ourselves. I was surprised to know that there were more than 100 students in grade 11. I thought that all of them were to study mathematics. Later on, I came to know that they were studying some common or compulsory subjects with us. Finally, there came the time of the mathematics period. As much as I remember now, there were about eight students out of which two were girls. This was/is the scenario of mathematics majoring class in the context of Nepal. The situation now has become even more pathetic because most of the colleges have no students to continue their mathematics education in the higher study (Panthi & Belbase, 2017). Let me share my story here.

We were eagerly waiting for our mathematics teacher as if we were in a battle and waiting for our captain to start the battle. Finally, our teacher entered – a short, fat, and middle-aged male. After our usual student-teacher ritual, Mr. Guidebook (since this teacher used to use guidebooks even when he taught in the class) started writing the names of books and their writers' names on the board so that later we could buy them. He first finished his writing and started showing the same books to us. He detailed what we needed to further in that class as mathematics students. He would say, *"This is the exact coursebook you need to*

*study this year. This is the only book you have to buy. Next, this is 'Old is Gold' (*A collection of questions from Nima Publication*) which has sufficient sets of questions asked in previous final exams. About 30% to 40% of questions will be the same in your upcoming examination. Third, this is the guidebook written by …… (*by showing a guidebook with a blue cover*) and this has the solutions to all the problems given in the textbook that I just showed to you (*showing the textbook*). If you solve the problems given in the textbook with the help of this guidebook and practice them repeatedly, I think you can achieve good marks in the final examination. If you can do this, you don't need to come to regular classes."* He finished detailing. Probably, we were gawking at him innocently and quickly copied the names of books and their writers as if we were going to miss the train. I was astounded but could not utter a single word because I had not expected those things from him. I had started my higher education in mathematics education aiming to learn mathematics conceptually so that I could be a good teacher. However, the bitter reality was in front of me.

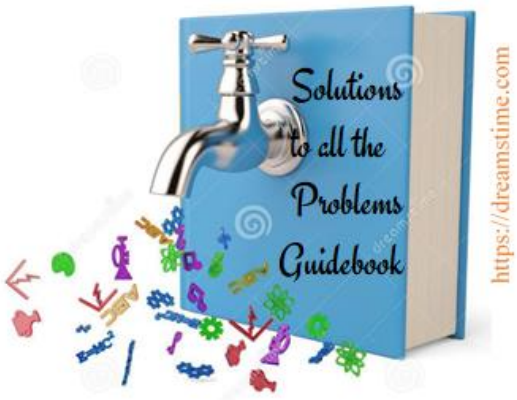

Figure 9. Guidebook – an ultimate source of solutions

Un/knowingly, I raised some questions, *"Sir, what about the concepts? How can we learn mathematics without understanding them?....."* His reply would look like this (with weird utterance): '*Boy! This is how you can learn mathematics. I learned in the same way. Now, I became your teacher. If you do one solution multiple times, you can understand the procedures, formulas, tricks, ideas, everything. These are enough to get good marks in the final exam. Besides this, what would you need in your life? Next, about understanding concepts to be a good teacher, when you become a teacher, you can understand everything. Now, don't worry. Follow the guidebook and solve the problems. I can help you if you don't*

understand the procedures. If you can do this, you need not come to college to study mathematics." After listening to him, I realized that I might have said nothing so, I sat quietly. Other friends were not uttering a single word. Arriving at this point of inquiry, I would like to reflect on that incident raising some questions here. *Was he serious? If we do not need teachers, why do we need schools and universities? Why do we even need teachers?*

As I critically reflect on this, I realize that the scenario of learning mathematics is quite common in our context. Using guidebooks (this seems to be replaced by digital platforms and modern technologies like Google wherein anyone can find the solutions), following them, and repeatedly doing the same solutions might have been the popular processes of teaching and learning in higher grades. The dependency upon a single guidebook by assuming it as a source of all the knowledge or guidebook as a teacher seems to be promoting the conventional model of teaching and learning similar to pipe pedagogy as discussed by Luitel (2009) which might be limiting to the singular source of information. The process of copying the solutions from the guidebook whether they are wrong or right might lead to a false understanding of knowledge. I had similar experiences of false understanding while blindly copying them and memorizing them. This could be because of having full confidence in some guidebook writers. However, *how can a learner develop context-based and conceptual understanding and other skills by copying the solutions from guidebooks and solution manuals? What happens with the 'thinking-out-of-the-box' skill of the learners?* Nevertheless, I could understand the solutions to problems by repeatedly doing it, which could be good for me to score the grades, but is it enough? Is it only the final thing we need in our present and future life?

When I was doing my IEd in mathematics education, I got an opportunity to teach the nine and ten grader students in a tuition institute. This was the first experience I got of the teaching profession in the journey of education. In this institution, I had to teach the students of both private and public schools. So, in the very beginning, I faced difficulties in this field. The first reason was that I had to study those books and solutions to the problems from the beginning because I had almost forgotten them which I had studied while appearing in the SLC. Here, my previously accumulated knowledge was insufficient or perhaps useless. But I needed to teach them because I also had to survive financially. Thus, I started revising once again whatever I studied in grades nine and ten. In doing so, I took the help of several guidebooks and solution manuals. Day and night, I practiced them repeatedly so that I could successfully solve those problems while teaching my students. In this situation, I practiced several times in other time and taught the students in a different time. Whatever I had practiced, I taught them in the same way. In this regard, I became a transmitter of knowledge in the form of absolute truths (Ernest, 1991, as cited in Shrestha, 2018). However, I was good at explaining the procedures in solving problems, proving theorems, giving them the best tricks (Pant, 2015), and providing 'the most' important formula to recall.

Sometimes, I also used to forget those steps or formulas while solving routine problems. During this particular situation, I felt ashamed of myself being unsuccessful in getting the right solution as if I committed a crime or sin. I used to practice them time and again by going through several guidebooks. Once I was done, I would feel like winning a Nobel prize or have become a 'master of mathematics'. This might be the ego I developed about myself. My students' praiseworthy words/sentences such as 'you are excellent', 'you

could/can solve the problems that our teacher in school could not', 'you can explain everything vividly', 'you are brilliant in mathematics' led me to be an egoist teacher/person. In this overall picture, guidebooks and textbooks were the soldiers, teachers, weapons, etc. for me to compete in the battle of teaching successfully without exploring other sources of knowledge.

Above all, the teaching and learning scenarios in IEd might give a picture of the linear models of accessing knowledge and information. Even the writing procedures of stories, essays, dialogues, etc. in Nepali and English languages appeared to be followed by their standard rules. I read the definitions of curriculum given by different experts but understood curriculum as a textbook as experienced by Luitel (2020). I read about several learning theories conceiving them as rules of reproducing knowledge. I studied teaching mathematics but I beholden it as teaching the subject, not the children as experienced by Pant (2017). I could master knowledge and information thinking they are useful for the future, but perhaps I did not know so much what/how/why my future would be.

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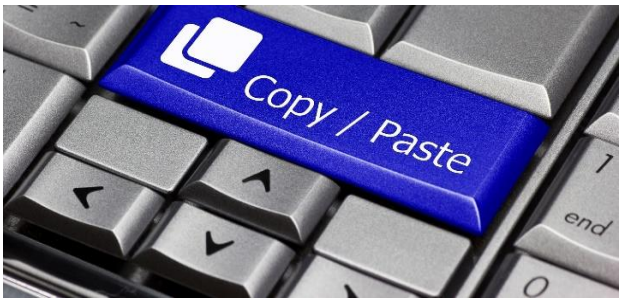
Copying and Pasting Pedagogy!

I was independent in terms of earning and learning because I got only my family's moral support but not the financial to continue my formal education. In such a situation, I had to manage everything myself. As the first child of the family, I had another challenge, that was to support my siblings financially in their study. Whether I was successful or not in this regard is another story, but I have tried to fulfill my responsibilities as the eldest son of the family. My self-independency in both earning and learning made me choose my ways of being, becoming, and living life. In this way, I chose to continue my higher education after completing my 10+2 level in mathematics education. I was the district topper at this level. My persistent hard work perhaps led me to pursue my BEd in the same faculty that is in

mathematics education. However, I was again in a dilemma. As I was financially knackered in choosing the right option between two: doing bachelor at the headquarter or at Kathmandu, the capital city of Nepal. But, because of my interest in exploring the other worlds and competing with a mass in terms of study, I chose Kathmandu for my further study. It was a nerve-racking decision for a person like me with a low income to stay in the capital city. In the beginning, I stayed with my relatives in a room. Initially, I faced challenges in choosing the right college for my BEd. Meanwhile, I explored some private colleges. I was frightened with their monthly and yearly fees as it was beyond my afford. Thus, I planned to admit in a government or a public campus. Finally, I joined a reputed government education college in mathematics education.

I use a pseudonym 'Xerox University' to represent this university. This might be apt because the tradition of teaching and learning, in this university, was (to great extent) limited to the copying-pasting business. Textbook writers were/are copying the information from other textbooks (generally, textbooks of Indian or other foreign writers) and pasting them in their textbooks. Teachers were/are copying the information from those textbooks and pasting on the black/white boards. Finally, students were/are copying the same information from black/white boards/textbooks/notes and pasting them on the blank papers in the final examination. This copying-pasting business starts from textbook writers and ends with examination as the final battle of students. This tradition does still exist (recent communication with students as well as teachers). When I got an opportunity to teach the students of bachelor level from the same university, I also followed the same process of copying and pasting. Reflecting on this, I would like to portray some of the interesting incidents here.



Don't Leave Comma (,)

My learning became more complicated at Xerox university as it was beyond my expectation. I was not getting what my teachers/professors taught. The usual job as a learner would be going to the classroom, listening to boring lectures, copying their notes from the boards, and finishing note copies by repeatedly pasting those notes. The learning process became even more complicated when I was in my second year of my bachelor's degree. There, I encountered 'Real Analysis' and 'Geometry' filled with propositions and theorems and their proofs. People would call them pure and abstract mathematics. My copying-pasting tasks increased significantly.

Here, I remember the teacher who used to copy everything from the textbooks even without leaving a single comma. His usual words to us would be, *"There are the theorems and their proofs proved by the genius and great mathematicians. The questions will be asked from this book and this is the only book available in our country. The examiner will use this book to check your answers. If you write the same without leaving a comma, you will get full marks, otherwise, your marks will be reduced, or you will even not get the marks. So, practice copying the things as they are."* In the very beginning, I did not agree with him, but later I found that the teacher was one of the writers of the book. On top of that, my seniors also told me the teacher was right. One of the seniors who was also the last year's topper, told me, *"Your teacher is correct. The questions will be asked from the book you were suggested by that teacher. We need to write the same what is in that book, otherwise, there is a huge chance of getting marks reduced. Last year, there were ten questions (eight short answers and four long answers). I attempted all the questions. However, I wrote the proof of two theorems as per my understanding and my words. Unfortunately, I got just 80 out of 100. So, I am sure that we need to write as it is. This year, I am going to write accordingly in the final exam (according to the teacher) to get more marks."*

Students would call this teacher a *'printer'* since he used to copy everything accurately. In addition to this, he used to extract the figures as they were in the textbook without making a single change in them, even the name of the figures would be the same. I consider this instructional approach: copying-pasting pedagogy. The teacher's strategy would be a means to frighten students by saying that only the exact proofs and solutions get good marks. I was afraid of scoring low marks or failing the examinations. Because of this, I tried to copy the answers from the book or notes as they were. I must say that I mastered copying things on notebooks and memorizing them by rote learning.

Similarly, I confronted another teacher in the level. The teacher used to teach us 'Advance Calculus'. He had a rich experience and expertise in copying the old notes. Reflecting on his activities at this moment of inquiry, I must say that he used to love blindly copying and pasting proofs of theorems and solutions to the problems from his old notebooks.

It could be any day in January 2013. I was in the third year of bachelor's degree in mathematics education. The teacher was extracting the Heine Borel theorem on the whiteboard. The theorem was quite long (almost two pages). He finished writing four or five sentences from that old notebook. Suddenly, a paper in which the theorem was written dropped from his notebook. He did not notice this. So, he continued copying the proof of another theorem from the very next page. Finally, he finished copying it and checked the last line of the proof which possibly used to be the same as the statement of the theorem. But it did not match. As much as I remember now, he was panicked and started going here and there because he had copied almost 90% of the proof from another theorem. He was envious and sweating. About five minutes later, one of the students sitting in the first row informed him the page of his notebook is on the floor. The teacher quickly picked up the paper, adjusted that in his notebook, and started saying, *"Oh! I am sorry. We have copied the proof*

of another theorem. Let's copy the exact theorem." We looked at each other's face and laughed at him. I saw the teacher's red face. After copying the theorem again correctly, one of my friends raised some questions, *"Sir, in this way, how can I understand these theorems and their proofs? What will be my future if I do my study this way? What are the practical real-world applications of these knowledge and skills? If there is no use of these things in our daily life, why are we studying such nonsense?"* As soon as he finished asking such questions, the teacher started his own business with angry ingredients in his voice, *"You are here to get an academic degree and my job is to teach you and finish the course in time. I have 15 years of teaching this subject and none who raised such questions against my method of teaching. The student used to get above 90 out of 100 in my subjects. I am one of the members in finalizing the questions for your final examination. Just copy what I have taught you. Practice them unless you cannot memorize everything. Finally, you have to write in the final examination what I have written in the class. Regarding your future, learn these things when you become a teacher. Therefore, no queries. Just do what I have said."* Listening to this, probably, we were stunned.

In this process, I developed a sense that learning has different layers, so getting an education at school and university levels can be completely different. In my BEd, I might have been guided by conventional and unhelpful conformist perspectives of giving and taking mathematics knowledge (Luitel, 2009; Shrestha, 2018). The doctrine might be powerful to confirm knowledge by accepting them as other's text. It appears to be that I (including others) was just dominated or hegemonized by those other's texts and teachers were the means/transmitters to receive without questioning and doubting and bring them to students. Here, I assume that this 'pedagogy as a cryptography' in which only two people can decrypt the information (i) coder and (ii) decipher. In this line, I assume student as an information sender who is unknown about the message (knowledge without understanding-what is inside

the box?) but know, to some extent, about the outside features of the letter or box (a form of knowledge), a coder is a person who made/created that knowledge of mathematics, and decipher is the person such as teacher and examiner who knows only about that mathematical knowledge (probably they also do not know).

There was a well-accepted tradition of studying at the bachelor level. Interested students would make the notes so that they could use them when the exam was near. I used to do the same. One or two months before every final exam, I used to start reviewing those notes, copying in the exercise copies time and again, and remember as much as I could. Next, I used to spend about 14 or 16 hours of every day reading everything possible. I used to have a lack of time for having food, getting sound sleep, and entertainment. All we need/ed to do is repeat the whole textbook and notes two or three times so as to memorize everything. The situation was more than the worst, and I started having several health issues and learning anxiety at the same time. In this way, I experienced several health issues and psychological disorders (Wagley, 2016). The practices appeared to promote negativity and disinterest towards learning leading to increased dropout rate and unemployment. Arriving at this point of inquiry as I reflect on this, I find myself a victim of this disempowering and educationally oppressing practice. So, I envision an alternative system to this by raising questions: *How can we/I improve/change such practices for the effective education system? What are the better alternatives to bring students to fully participate in educational activities? How can I/we encourage/empower students to value education?*

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Waiter Pedagogy: A Knowledge Transmitter!!

'Bring me a bottle of wine!'

'Memorize this formula or trick to solve this problem!'

I am comparing these two expressions that arose from two different contexts: a restaurant and an education system. The first context is associated with the job of a waiter and the second context is the job of a student or a teacher. Relating to these two contexts, I am going to present my story here.

It was the time after I completed the SLC examination, also known as 'Iron Gate'. I was eagerly waiting for the result. The result of the SLC would be published three or four months later from the time of examination. To utilize this three- or four-month gap, students from the good financial background would go to take bridge course classes and some others would take computer and language classes. However, the students from an economically poor background and mostly from village areas like me had and have to work for earning (perhaps some of them start their earning career from this step). In my case, I chose to work in a restaurant as a waiter. I was appointed as a waiter in a restaurant through the connection of one of my maternal uncles. The restaurant was famous for providing fast food services. At the beginning of this work, I was presented with the works such as cleaning the floors, doors, stuffs to have food (spoon, plates, glasses, etc.), tables, chairs, etc. Perhaps, these were the works that every beginner or tyro has to start with in restaurants and hotels. Anyway, the positive side is that I was able to develop such skills. After working for a month, I was allowed to take orders of the guests and serve them as a full-time waiter. My daily work had the same pattern. For instances, every day putting on a waiter's dress (a black shoe, a black pant, a white shirt, and a short suit, etc.), managing required things such as trays, bottles, glasses, plates and spoons, menus, order pads, napkins, etc., and arranging required things in the respective tables. The next thing to do was going to different tables where guests sit to have foods and drinks, taking their orders, informing the orders of customers to the kitchen or cooking sections, waiting for foods, putting them on the tray, taking foods to the respective tables, serving the customers, taking the bills to the customers, and returning the cash to the

account section. This was more like a mechanical process. I was unknown about how to cook those varieties of food or make the different dishes and recipes. I just knew the stepwise process of serving those foods and beverages to the customers or guests.

Linking my teaching and learning with the aforementioned context, the practices as a teacher and a student appear to be similar. As a student, I had to transmit the knowledge that I had received from teachers to the notebooks and finally on exam papers. The only aim was to pass the respective grade and score good marks just like me as a waiter served the customers to get the salary at the end of every month. I was equipped with the knowledge and skills to perform those never-changing steps while solving routine problems and information to paint as it is on the blank papers. I had not been presented with the contexts of how these knowledge and ideas are formed and developed originally. Perhaps, I was not experiencing the sources of knowledge, their indigenous development, and their original taste just like a waiter is unknown about the mere taste of foods, their process of making, and the experience of integrating different ingredients to prepare a particular variety of food and beverage as per the need of customers. Just as a waiter has several routine jobs, a learner has several subjects to study. The similarity between these two people is that they perform their duties (too mechanistic). Thus, the only job of these two types of people is to perform a predefined and predetermined set of actions to meet a target (solve a problem or solve the hunger of customers).

As a teacher, in my initial years of teaching, I was capable of promoting the linear model of pedagogy (Shrestha, 2018) or pipe pedagogy (Luitel, 2009). As a teacher, I perhaps acted as a waiter to transmit the knowledge prepared by the so-called ancestors and experts to students without knowing how/why that knowledge were/are constructed. Using the chalk and duster (similar to a tray of the waiter) as the ultimate form of materials, the process used

to be followed by lecturing to the muted students to meet the institutional and curriculum goals. I followed the law-like procedures in these years of teaching to transmit whatever was written in the textbooks – assuming they were the only sources of knowledge. This was so natural because I was taught by my teacher in similar ways. Earning a good amount of money and making a maximum number of students pass might be the stimulus for me to implement those disempowering pedagogical approaches. I explored more about this notion of pedagogy only after my master's degree in mathematics education that led me to critically reflect on my previous taken-for-granted practices, as a result, I might be empowered to use more enabling and progressive nature of methodologies in both teaching and learning.

Here, the waiter pedagogy is likely to be similar to the conventional method of teaching and learning that works as an input-output dualism – promoting pedagogy as a culture of reproduction. More so, the waiter pedagogy, conventionally, is aligned with the transmission of knowledge and rote learning skills defined by others to students – following the never changing structure of knowledge reproduction. One of the problems of such pedagogy can be the inaccessibility of students' involvement in the original knowledge development process. It appears, by nature, that learning is dependent upon structural ways of knowing and doing things which are required in developing some specific cognitive skills.

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Examination: A Race

Student A: *What do you take with you for the exam?*

Student B: *A notebook, a guidebook, a guess paper, and other cheats. What about you?*

Student A: *I also have similar weapons. This year, I need to be very much cautious while keeping these stuff with me and cheating inside the exam hall. Last year, I was almost expelled. The guard saw me cheating. He was so kind, buddy. He took my copy for about 15 minutes. Later on, he returned. Thank God. I was saved at once. However, I will follow all the security measures to keep these stuffs. Uff!! I wish I would never face examinations.*

Student B: *Yes, we should be careful while cheating.* (Is it teaching or cheating? I am playing with the word. Hahaha!). *Some guards are so strict. Damn! How could they forget that they also came from a similar context? I can guarantee that they also cheated and passed the examinations. How can now they be so irresponsible? They should not forget their ground, should they?*

Student A: *Yes, they should not. I am still angry with the guard who was in our examination hall yesterday. He was so arrogant. हिरो बन्न खोज्दै थियो यार (*Literally: He was showing off as if he was a hero or superman). *Let's hope that I will get a very kind guard today.*

This might be an intense scenario representing the tradition of students appearing the examination which tests his/her lower cognitive ability, mostly remembering. I was also the victim of such examination practices; *how could not I be?* I was a part of the same education system.

In the educational context of Nepal, you might have experienced a similar tradition of the examination. I took each examination as a big race. I became one of the players. Perhaps, I was habituated with the understanding that 'I should win the race otherwise I will be left behind'. Coming to the nature of every examination, a particular day and time for the

examination is scheduled by the officials. With this, the race was/is on. I used to collect all the notes, guidebooks, and textbooks to read them again – remembering everything for the last time. Students would start practicing for the sake of remembering and keeping things in mind so that they could write at least something in the examination. I did the same. There is a place or exam hall set to run for a three-hour examination. The examination halls and building are covered with optimum securities. Some police and military forces are used to control the examination or possibly to create fears in the students so that students cannot cheat inside the examination premises. On top of them, there are controllers of the examination (a superintendent), teacher-guards, and other staffs to manage the overall examination process. The most important job of them seems to prevent students from cheating in the exam hall, I guess. *What do you think about this?*

For students, appearing in the examination seems to be a going-for-a-war situation. They are always under the pressure of reading everything that they were taught in the overall year or semester from the beginning. So-called talented students and some others who want to get good marks and grades do not want to miss the single piece of information provided by teachers and textbooks. The below-average students read things at least to get the pass marks. Next, as per my experience, cheating in the examination seems to be our tradition. Except for some students, rest of the students might not be missing a single opportunity to cheat inside the examination hall because that was/is only a means to save them from being failures. *Is not it? Is this a good tradition? Is this what we call education? How can such practice be improved?*

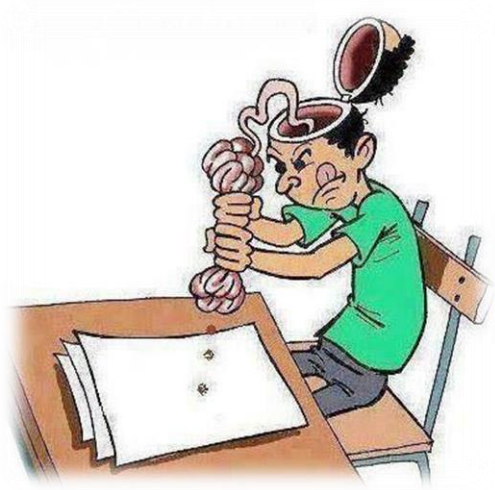


Figure 10. Student in cognitive test

The preparation of cheating perhaps starts from home. Students make cheats by writing important information on the papers, some carry guidebooks and guess papers, and some even carry the textbooks and notes. When I was in my BEd, there was a particular stationary or shop which used to provide the printed photocopies of notes and textbooks in very short and compressed form. Those stuff were tiny pieces, and students could easily take them inside the exam hall. The tradition is still in practice. There used to be and is a business of making cheats for students. On the exam day, students carry everything as much as possible. Most interestingly, only a student knows where to carry those stuff in their body parts (!).

The scenario of the examination center used to be and is scary. Students are checked in the gates to search those cheating stuff. The guards can find some such kind of stuff of some students but not of all. Those whose stuff remain safe; they are blessed by God because there are some possibilities to copy answers from these stuff during the exam. Now, students are sent to respective halls according to their symbol numbers. At the same time, some students find places to put their cheating stuff such as in the bathroom and toilets, under the desk, in the window, etc. Now, the formal examination or I call it cognitive test starts. After getting a question set and paper, the pin drop silence should be maintained. Two or three or more teachers have been mobilized for maintaining the rules so that examinees cannot move, cannot talk, cannot go to the toilet before one hour, cannot cheat, cannot see other's paper, etc. During the process of writing, students dare to cheat. Some of them become successful to copy the answers and some others do not depend upon the environment inside the exam halls (loose or tight). The students who are

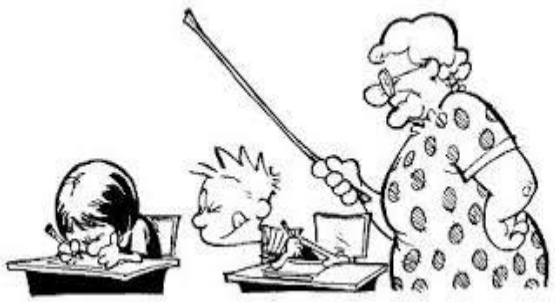
https://www.dreamstime.com/illustration/student-cheat.html

Figure 11. Student cheating inside the exam hall

found to be cheating are punished by the guards. These punishments are physically and psychologically painful for students. The students can be expelled – they cannot attend the examination for one or more years. Some of my friends were found cheating in the examination, so they got expelled for two years.

These practices are physically and psychologically threatening for students. Reflecting on this, I am sharing here one of my experiences.

It could be any day in July 2010. I was celebrating the final examination of grade 11. It was the examination of 'Basic Mathematics'. There was pin-drop silence in the exam hall. Guard was a very strict teacher who used to teach mathematics at bachelor level. We used to be afraid of him inside the school premises too. The bell of one hour rang. I was busy recalling the formulae, rules, and tricks to solve questions given in the question paper. One of the girls behind my seat was mumbling and telling me to show my answer sheet so that she could copy solutions. The guard warned her several times, but she was ignoring. After one hour, she took one of the cheats and started copying. The guard noticed this. He came to her and told her to show the cheats. She was extremely frightened, nervous, panicked, and haphazardly showed the cheats she had. Then, the teacher slapped, probably three times, on her chick and fiercely pulled her hair. The girl started crying so loudly. I was sitting so close to her. I was witnessing the entire incident without telling anything. The situation was so terrible. The girl was begging the teacher to return her paper and requesting him not to spoil her life by expelling. The teacher forced that girl to stand on the desk for 15 minutes and agreed to give her paper back.



https://dlpng.com/png/6634806

Figure 12. Student cheating other's writing

My mind became blank. I could not remember what I had studied during the whole year. I could not even write a single sentence after this incident. Finally, we all submitted our answer sheets. The situation must not have happened in the examination hall. We all students became fierce and agreed to start a strike against this teacher and his behavior. We went for the strike and eventually, the college administration was ready to replace that teacher. The very next day, I did not see the teacher in that college.

Talking about the scenario of the premises of the exam center, after the exam gets over, one can say that the premises of the examination center become so messy because the cheating stuff such as papers, notes, books, guidebooks, and guess papers thrown by the students on the ground. The dirt collectors collect these things and they burn all of them later. This practice is still the same. The examination centers all over Nepal seem to make strict rules in the examinations and try to control the cheating practices of students. Arriving at this stage of inquiry, I reflect, *where is the problem? Are cognitive tests and summative assessments problematic for students? What could be the alternatives for such an examination system? Do we need the replacement for the sit-for-examination tradition? If so, what are the alternatives to start with? Or do we need to legitimate more strict rules and regulations to conduct such systems?*

To me, the problem is in our assessment practice. *How can we accept that three hours lower-level focused cognitive tests assess the learning of learners? How about their higher-level cognitive attributes and other dimensions of learning?* The summative assessment strategies such as high-stake examination appear to increase the unnecessary physical and mental health issues in both learners and teachers. The assumption of viewing examination as a one-size-fits-all approach to evaluate students regardless of their diverse abilities might be disadvantageous, so this needs to be challenged, improved, or changed.

The question in the paper is asked to write the definition, characteristics, and types of project-based learning but this possibly does not allow students to do a collaborative project work through which students' diverse areas can be assessed. The question is asked to evaluate the limit of the given function, but it would not allow applying the concept of limit to their day to day life. The question is asked to write the advantages and limitations of behaviorism, but it does not allow students to implement behaviorism in teaching and explore the advantages and disadvantages through practical works. The questions do not seem to be allowing learners to be more critical and creative. The practice does not seem to allow students to paint their understanding, their creation, their feelings, their ups and downs in the process of learning, their own abilities, and inabilities, etc. In the contrary to such practices, I agree with Pant (2015) on the nature of assessment which 'should foster a sense of "cooperation" rather than "competition". Therefore, the assessment does not only mean to provide arithmetic scores rather it aims at providing information that will help make decisions concerning remediation, enrichment, selection, exceptionality, progress and certification' (p. 77).

As a student and teacher, I experienced our major emphasis on using summative assessments or evaluation to measure what students learned in a particular academic year. Summative assessment is likely to be product-oriented, grade and mark as the outcome(s) focused, typically done by using high-stake examination to level the students because no further revisions are made, assessment of learning, and done for decision-making by ignoring the different abilities of students (Tomlinson & Moon, 2013). I strongly believe that providing grades or marks is creating a divide among students as in the caste system. Unlike the formative assessment, evaluation tradition does not look like more than a race for students. Observing the huge pitfalls of such an examination system, I am against such practices of blindly relying upon one-size-fits-all means of measuring and labeling students

based on their cognitive behavior and performance. I do not completely deny the summative assessment practices which might also be important in education, but they could be re/considered as per the need and level of students. Instead of high-stakes examinations, it could be better if we explore alternative forms of assessment to assess students' learning thereby helping students to improve their learning. Perhaps, the quality measures or assessment procedures can be implemented to practice alternative forms of our evaluation system. Such approaches might be the use of project-based assessment and other forms of authentic assessment with proper rubrics that could replicate the outdated tradition.

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Reflection on the First Research Question

Arriving at this moment, I wonder whether I am able to give justice to my first research question: *In what ways had my academic journey from school to under graduation shaped my identity as a conventional/traditional learner and teacher?* throughout this chapter. The primary focus of this chapter was to present my narratives by articulating from different vantage points with reference to my theoretical orientations. This seems that my academic journey survived under the domination or hegemony of conventional one-size-fits-all approaches of teaching and learning and assessment practices such as rote recall and memorization, repeated practices make one perfect ideology to grab eidos, knowledge transmission is only the sacred job of teacher and students, guidebooks have all your solution, guidebooks and textbooks are the ultimate sources of knowledge, examinations are only the means to get assessed, to illustrate a few. Promoting the desert-like teaching and learning approaches, the arts were probably segregated or detached from my learning context. Arriving in this conscious state, I feel proud of myself because I was able to score good grades and marks, collect certificates, and get several awards. The practices might be far from holistic education perspectives that call for an education system primarily concerned with the

overall development (physical, emotional, intellectual, and spiritual) of a learner (Miller, 2007). From this point of view, holistic education is not merely an acquisition of basic knowledge and skills. I am quite satisfied that I was able to address my first research questions by scrutinizing how contemporary (according to my narratives) or present educational practices could be preventing us from shifting our theory and practice to embrace more empowering versions of exercising education.

Of so many questions raised within me, I am critical regarding the practices I experienced. I am raising some questions such as: *are these what I need/ed as a human being? Are these enough for a person to survive in this complex world? Is this a sustainable learning? Who has been benefited the most from such an educational system? How about my and others unsuccessful stories and experiences? Is the education system responsible? Whose voices are being heard? What/how/why do I need meaningful learning experiences for me to become an agent of change whose primary task is to solve the existing problems arising from diverse areas of my real-world?*

Similarly, I am asking some groundbreaking questions to myself and for others. Such questions might have been pertinent to the necessities of bridging students' lifeworlds to make conceptual connections across the contents thereby developing knowledge, skills, and attitudes including creativity, communication, critical thinking, and collaboration. *How can we integrate the lifeworlds of each student in the context of culturally diverse countries like Nepal to promote a holistic version of learning that immensely focuses on knowledge as a whole and considering the child as a whole person?* In the next chapter, I will enjoy exploring my lived experiences in the form of narratives to answer some of the fundamental forgoing questions.

CHAPTER IV

CRAFTING MY NON-ACADEMIC PURSUITS: A SCENERY FOR HOLISTIC EDUCATION

Chapter Overview

In the previous chapter i.e., Chapter III, I articulated my lived experiences through some narratives of my academic world portraying the conventional/traditional model of education that shaped my identity as a learner and teacher. I expressed here and there the need of an education system that has the potential to value/integrate the lifeworlds of students for the meaningful learning experiences characterized by the notion of holistic education. This could be one of the alternatives to solve some of the arising problems in education by promoting contextualized and empowering educational practices. This prompted me to develop the second research question of this inquiry: In what ways could my non-academic pursuits contribute to my becoming of a learner, teacher, and teacher educator guided by the notion of holistic education?

Situating my discussions to address this question, in this chapter, I tried to depict my lived experiences of my non-academic world from my birth to the bachelor level. The articulated discussions are the understanding that I developed during my MEd in mathematics education and MPhil in STEAM education. Therefore, this chapter consists of how/why my non-academic world was/is powerful to embrace the holistic and transformative perspectives of education. I tried to portray my narratives and discussions under the major themes: *Brick Making Pedagogy: Making Learning Contextual, My World of Arts: Can Education Reach? My World of Games, My Worlds with ICTs, and My Entrepreneurial World: Let's Turn Ideas*

into Actions! Moreover, I ended this chapter by reflecting on the research question particularly developed for this chapter.

Brick Making Pedagogy: Making Learning Contextual

Starting this journey of writing my own stories (from non-academic lifeworlds) that have pain, sorrow, difficulties, hardships, surprises, excitements, and some successes, I have been emotional and heartbroken. These are the stories I have shared with very few near and dear ones because there are the people like me who want to hide their painful journey. Having understood the value of my own experiences in wider academia, I am telling my stories which, I think, have prodigious educational significance. Here I have become strong enough to share my lived stories so that every one of us can share our experiences thereby contributing to this education system. In other words, I accept that everyone's story could be inspiring and could bring a change. This is my endeavor to portray and share my hidden stories. Now, let me welcome you all to my non-academic lifeworld.

I would like to begin this with my childhood. Everyone has a unique childhood story, so have I. There may be both painful and gainful experiences that one has to go through during her/his childhood considering them as the parts of our life. However, I have a different story to tell the world.

I was born and raised in an extreme poverty in Ramechhap district in the eastern part of Nepal. I am the first child in my family. The first child is supposed to be the matter of celebration in most of the families, but in my case, my parents were in tears right after my birth as I was born unhealthy; suffering from an unknown disease. Facing tremendous hurdles and undergoing through several medical treatments, I could survive luckily. In chapter I, I briefly discussed my journey of experiencing two different worlds simultaneously every year. The brick factories were the sources of income for our survival. Since my birth, for the next about 18 years, I spent half of the time of my age in brick factories.

The brick factories were/are located in Kathmandu valley especially in Bhaktapur and Lalitpur, and some other places in the context of Nepal. In Nepal, people from disadvantaged groups – internally displaced by armed conflict, natural disasters victims, landless and having no source of income to survive in their village go to brick kilns to manufacture bricks (UKEssays, 2018). I still remember my painful childhood and teenage in which I had to survive as a child labor and later labor in those brick factories. In this disruptive and devastating situation, I dared to complete my school education. Given this context, my schooling was also divided into two different parts. I could attend the school only when my family was in the village but when we were in the brick factories.

In brick factories, we, as laborers, had to work for minimum wage which was insufficient to fulfill our very basic human needs. Therefore, we spent several days and nights with an empty or half full stomach. I had to work with my family in those extremely and inexpressible freezing seasons. This is still a similar tradition of people going into brick factories to produce bricks. In those extremely cold seasons, I had to work with cold clay and mud from the early morning (around 4 am) until late night. Until I was nine years old, I had to do simple and easy work which still most of the children do. For instance, I had to support my parents by picking up the mud, piling up the bricks, and sometimes producing raw bricks. Meanwhile, I also had to look after my siblings. Arriving at this point of inquiry, I question, *why has labor been paid with low/minimum wage which is insufficient for his/her survival? What about the child rights of children who work in brick kilns as well as other factories as laborers? Who is responsible for this: the government or the family?*

By making bricks, we could earn some money so that we could survive in the next very half of the year. In other words, the earning of our family depended upon the season (environment) and the health status and number of workers in the family. The family who could not earn a good amount of money would have to go through economic crises and hurdles in the village for the next six months. The condition is still similar in the context of people who are working in the brick factories. As far as I remember, we also had to go through such economic crises. *Is not this a pathetic situation?* After my 10th birthday, I involved myself in full-fledged raw brick making procedures. The responsibilities such as preparing clay for the next day's brick making process, cooking foods, bringing mud, dragging clay from the ditch and putting it on the field, making bricks, flipping bricks, and carrying them to take to the respective piles increased in me. Typically, brick making procedure (see Figure) follows a particular order. There are tools to produce bricks using clay. People sit in a particular row while making bricks. The process repeats unless the prepared clay is finished. While making bricks, the situation is hazardous because of the mixture of wind, mud, and pollution.

Figure 13. People making raw bricks

I worked as a child labor to produce bricks with my family members. My daily job was to wake up around 4 AM in an extremely cold morning to dig out the clay from the ditch, a place covered with cold dew and frozen water. This used to be a painful situation working barefoot in the clay for almost two-three hours for digging out the

Figure 14. Brick factory in cold season

clay in the early morning in those extremely cold seasons. Let's stop here for a few seconds and imagine the situation. *What would be your expressions? What would be your experience? Can you imagine, as a child, what sorts of hardships and pains I went through?* We are likely to hesitate or not able to go out of our bed in the morning of the cold season. But *how would I face such challenges in those brick kilns? Can you imagine that my heart was shuddering so much?* You can imagine the vulnerabilities. Oh my god! This is the situation that many children still have to face in those brick factories.

While we were digging out the mud in the morning, my mother used to cook food for us to have in the morning around 6 o'clock. We used to have food at six and our job of making bricks used to start. We all members (who can work) used to start it together. Meanwhile, my father and sometimes I used to bring the clay from the collection to the appropriate places. Brick is not made up of only clay, it needs other materials such as sand (a particular mud), a tool (a rectangular shaped object made by wooden and iron and with some pictures or letter written inside), and a wire (usually made by silver or steel-a curve line-shaped wire) to cut the clay. There might be a particular process of making bricks in all the factories. People sit in a particular row. The first person starts the process, then the second, third, and so on. Meanwhile, there is a pattern of keeping clay (A linear form), a pattern of people sitting for making bricks, a pattern of putting clay, etc. We need to change the sand frequently in the process of making bricks. You can imagine the context/environment of making bricks in such a cold morning and the days with heat and air mixture of sand and mud.

Can you imagine the place of making food for laborers in the brick factories? Oh! My Gosh! It was likely to be a dirty place full of clay, mud, and sand. We used to have our second meal between 12-2 PM and by then would have some rest. There used to be two jobs lined up; making clay for the very next day and piling up the prepared bricks (made one or

two days ago). These two tasks used to go side by side. Generally, people who have the greater capacity do the first task whereas people who have less capacity such as children and women do the next.

The first task has a mechanical process. First, we need to dig for the required amount of mud. Then we need to put the required amount of water on it. Next, we mix it up with the support of our legs to make it a clay. We then collect the clay at one side of the ditch. While preparing clay, we also use some tools such as a long and thick stick, kodali, and water pouring pot. I will discuss these tools later in this section. The job usually takes two to three hours depending upon the number of persons involved and their capacity. However, the context has changed a lot by now because most of the brick factories use machines and other labor to prepare the clay. In this modern context, the job of people who make bricks is to take the required amount of clay to their respective place using a one-wheeler tool (wheelbarrow) which has 50 to 100 kg of capacity (see the figure) and produce raw bricks.

Figure 15. Man putting clay made by using machines (modern days)

Piling up the bricks to make piles was/is another task. In this task, there is a particular place, generally, the edge of the grounds is used for making piles of raw bricks. Next, the job is to bring bricks from the ground to pile them up. The bricks are kept very systematically in the pile so that the bricks in the previous rows support the bricks in the following rows. This process of collecting bricks and keeping them on the piles usually takes two to three hours depending upon the number of persons and their capacity. These two tasks usually end around five to six O'clock in the evening. Then, there would come the final job that is to

make the third meal for the night. Around seven or eight O'clock at night, we used to have our third meal for the day and would go for sound sleep so that we could wake up at three or four in the very next morning.

A particular group of people are involved in taking raw bricks from the piles to the final brick making place (A particular place where raw bricks are kept systematically; coals and woods are kept with these bricks, and the fire is used to burn those coals and woods to finalize the bricks). It used to have two chimneys (movable chimneys) in the major brick-finalizing place, but nowadays only one chimney (fixed chimney) is attached to exterminate the smoke that comes out of burnt coals and woods. Similarly, a group of people who work inside this place keep the brick inside the factory, prepare them, and bring them out for the final use. Finally, the prepared bricks are supplied as per the demand of people for the construction such as houses, bridges, etc. via vehicles like trucks.

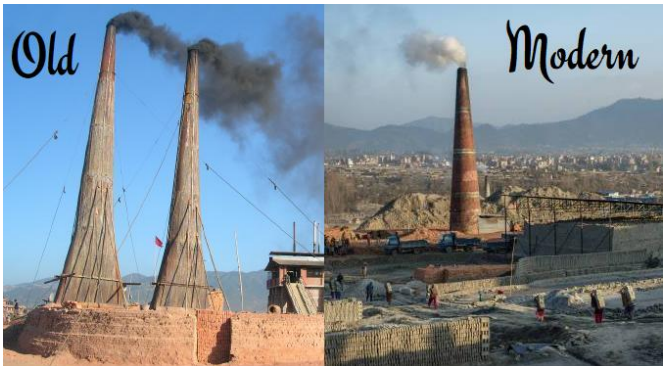

Figure 16. Brick factories in two different times

Children are given some time to play with each other. About seven or more days later, labors were/are paid by factory managers (also added to laborers' debit account) so that they could/can buy foods, vegetables, and other goods for the next seven or more days. People usually did/do not work on the next day of receiving money. In those days, children have time to play, watch the cinema, visit other places of their choices and relatives, etc. I have also experienced this in my childhood and even in my teenage.

Children were(are) compelled to help their parents to make bricks for the survival of the family. The situation of children was detrimental since they were/are forced to work hard in their early age. Moreover, working in brick factories was/is pitiful. *Can you imagine*

working hard as labor by your children in such hells? Hell, where there is almost no education, no health securities, no security of life, but full of pain, suffering, and exploitation. Perhaps, many children die due to the environment of brick factories. Children were/are likely to be forced to work in those cold and windy seasons. *Can you imagine doing work of mud and sand in the middle of the night and early in the morning of the winter season?* I did it till I was 18 years. Reflecting on it, I feel that a brick factory is like hell, a place where you go to earn some money by making bricks and doing other related jobs. In brick factories, work conditions are inhumane (in the polluted environment). More than 175,000 workers, in about 1100 brick factories, of whom as many as 60,000 are children, labor in unhealthy and unsafe conditions in Nepal's brick kilns (Health Research and Social Development Forum, 2016).

Coming to education, brick factories do not seem to be supportive for educating people, they are the only sources of an income of economically marginalized and poor people for their survival. They go to brick factories when they might not get other options to survive. Still, people from my village, even my relatives, go for brick making business. *How can children go to school in such a situation? Do/did children have any other opportunities/provisions to complete their education in brick factories?* This is an absurd question because children were/are not likely to get opportunities to go to schools. There were/are few organizations including Save the Children advocate for child rights thereby taking steps to free them from child labor. But these organizations have also claimed that children were/are deprived of education (Save the Children, 2016). Save the Children has claimed that around 37% of children aged 5 – 17 in Nepal are forced to work in

Figure 17. Child labor in a brick factory

brick factories. In this regard, I am one of the representatives. I did not have opportunities to go to school to complete at least my school education. Consequently, for me, the next world, my home in the village, was the only option to get an education. Handling both lives; studying and doing heavy work as a child was a challenge for me. However, I had to manage it anyway for my survival. In this way, I suffered from fears, empty stomach, pain, and so on in this journey of life.

From grade one to 10, every year, I attended schools only for six months. These were the days in which I experienced my school education. But in the brick factories, every day, I used to have some free time in the evening. I used to utilize that free time to read and write. This is because I wanted to continue my education. In this way, I managed some time to continue my education. Arriving here as I reflect on this, this was another experience of self-learning and self-preparing for accomplishing my education. In this regard, I would like to thank my parents who understood the meaning of education and allowed me to continue my educational journey even in such a critical situation.

Nowadays, there are some provisions of providing education to children. However, this might not have been properly implemented fully yet. This has been true only in policy because as per my observation still almost 80% of children working in the brick factories are not attending the schools. The education programs in brick factories seem to be appropriate only for small children (those who are not capable in the kiln field). This is probably not true for children more than 7/8 years of age because they are compelled to help their parents. The situation of getting an education seems to be quite impossible. I had also faced a similar situation. However, in my case, I could manage my work in brick factories and education side by side. In my village, for the first six months of the year, I continued my school education. However, in the next six months, I used to go with my parents to brick-producing factories. This way, I completed my SLC degree.

How did I continue my Education?

I would have about two to three hours at night for my study, before going to bed. During this time, I mostly studied the so-called difficult subjects like mathematics, science, and English. I rarely studied other subjects like social studies, population, etc. While studying mathematics, I used to copy the solutions from the guidebook and examples done in the textbooks and do them repeatedly until and unless I completely understand/memorize the solutions. Only after excelling in one particular problem, I used to solve others too. At that time, my teachers' statement 'practice makes a man perfect' was pertinent to me. In the case of science, I used to memorize the provided information. By doing this, I tried to understand the meaning but I failed many times because that was beyond my self-learning or self-directed learning abilities since I did not get the support from teachers as well as MKO who could scaffold my learning (Hall, 2007). I used to revise those contents which I had already studied. In this manner, I sharpened my brain to think and memorize and also widened for storing information.

The very next day I used to recall those solutions, definitions and facts of science, and rules of grammars and words of English while doing my work. While making bricks, I used to stop in the row and try to do those algorithmic problems or recollect the words, formulae, or definitions. I also used to write them on the ground or mud. I used to draw the figures to solve the problems or get a picture of the contents that I read previously. While working, I used to cognitively revise those solutions, revise the notes, and contents taught me when I was in school. This time, my parents used to shout at me, *'what nonsense are you doing, boy? Finish the work first'*.

Connecting Mathematics to Brick Making World: Investigating Contextualized Mathematics

I developed this awareness during my MEd and MPhil studies at Kathmandu University. I realized that my academic world of mathematics at the school level was separated from my non-academic world in those brick factories. I came to know that my childhood and teenage years in those brick factories were filled with myriad 3C's (contexts, concepts, and contents) of mathematics and other subjects. They might have not been linked or integrated by formal education in school education. The curriculum of mathematics and other subjects do not appear to have access to my world, or in particular my culture. Here, I am going to present some of those outstanding ideas thereby immersing myself in the discussion of how/why those cultures were/are powerful to integrate into our academic world through the interconnectedness principle of holistic education. They could be my funds of knowledge (Moll & Gonzalez, 2004). They were my assets of learning wherein I could learn contextually and conceptually. I could construct meaningful experiences of mathematics. However, I might have been pedagogically oppressed to passively participate in those disempowering practices of my formal education.

The Materials and/or Contexts for Learning

Handful Materials for Building Foundation. In the previous chapter, I articulated how I developed basic knowledge and skills of mathematics in grade one by repeating after my teachers and mimicking him/her guided by a spoon-feeding notion of education. I was able to count the numbers to 100 and many more before I attended my first primary school (I was not a blank slate). As I discussed above, I was taken in the brick factory since my birth. Since the age of four or five years, I had to flip the bricks (as shown in the

Figure 18. A child flipping the raw bricks

figure) by counting them up, I also had to count the number of bricks when collecting them to keep on the piles, the number of rows of bricks while making it, the numbers of bricks in one row, so on and so forth. I could feel them, break them, communicate with them, manipulate them, and modeled my objects. This way I developed my basic counting skills in my living culture of brick factories. Interacting with concrete objects, I learned foundational concepts of mathematics such as counting, basic operations of mathematics, geometry, etc. before starting my academic journey. The concrete materials became worthwhile to have ownership of my knowledge. Every day, I used to communicate with diverse materials available in the brick factories that were shaped by a basic understanding of various mathematical ideas.

Arriving here, I would like to connect this to the discussion made in the previous chapter (see the first theme of the chapter III); the teacher was too conventional. The way she taught us is likely to be outdated in the primary grades because, in these grades, pupils need some objects, models, or other concrete materials to interact with knowledge and learning basic numbers and basic concepts of mathematics and other subjects. In the foundational stage, manipulatives are required for children so that they can touch them, feel them, break them, build something from them. In so doing, children learn things like counting numbers constructively. However, teaching and learning practices are likely to engender memorization and rote-practice guided by one-size-fits-all approach to acquire knowledge. Next, the teacher also seems to be unaware (they might be aware but not practically implemented) of the cultures of students they come from. Since the classroom is a miniature community of the students from the diverse culture of practices and mixed abilities, it appears to be necessary that we address those practices by connecting their lifeworlds and

Figure 19. A process of carrying bricks to pile

cultures. In my case, I could learn through available concrete materials in the surrounding of brick factories.

In the following subsections, I discuss some of these phenomenal concrete materials that can be used to learn mathematics in a meaningful way.

My World of Geometry. "My head is spinning when I see geometrical shapes!"

"Geometry is one of my most difficult topics!"

"Geometry is all about solving routine questions and proving theorems!"

"I love geometry!"

"This world is made up of geometry"

These are some usual-like expressions that students at the school level make. *Have you heard the last two sentences from your students? How many of your students did express that they love geometry?* When I was in the middle and upper grades of my school education, I used to love geometry. This is because I was surrounded by geometrical shapes, figures, and objects. In terms of geometrical exposures, I was acquainted with multiple scenarios to explore. The brick factories were full of geometrical patterns, figures, and objects. Except for my teachers' instructions, I, sometimes, could relate some geometrical figures kept in the textbook to geometrical shapes and objects found in my surroundings. However, this could be limited to the person like me who probably did not know their real-world applications.

My Home in the Brick Factory: Our Shelter for Survival. The first house where I lived was made up of bricks. This small house was in a rectangular shape, a longer height on its front or almost cuboid. Some of such houses have square-based prisms. I grew up observing these models. This bricks-made home is a particular type of geometrically rich stuff. The house generally has one or two doors of rectangular shape

Figure 20. Labor's home in brick kilns

with no window. The rectangular-shaped tins are used on the roof of it and the door(s). The bamboos or wooden objects are used to support tins on the roof. In this context, I was communicating with various 3D objects and 2D shapes such as the house itself, shapes of its cross-sections, shapes of the door, faces, corners or vertices, edges, etc. The entire period in the brick factories helped me be habituated with such a house. These are the shelters for laborers in the brick factories. This, to some extent, clarifies that I used to live with geometrically rich objects.

Bricks and Brick-making Tools. Usually, brick has a rectangular shape. Thus, it is again a rectangular object. Similarly, the tool used to make bricks is another rectangular object. Several rectangular faces can be found in this tool. There are several lines (straight lines, perpendicular lines, parallel lines). Angles between these lines are the right angle. The two straight handles support while applying sand and making bricks. It has geometrical shapes, corners, and edges. There are usually some letters or pictures inside this tool but are different factory to factory. A curvilinear silver wire is used to cut the clay from this tool. This resembles the curve of $y = ax^2$ or $x = by^2$. These tools are rich in geometrical concepts and the graph of a function attached to the tools. These were the tools of my survival with which I interacted for more than 18 years. In those years, they became my part of life. From beginning to the end of the day, I had to talk to them, play with them, and dare to dream about the future.

Figure 21. Finalized brick

Figure 22. Brick making tool

Thelagada: A Wheelbarrow. This tool is used to carry clay from a huge collection of clay to a particular place to make bricks. This can also be used, in the brick-making process and to carry other stuff as well such as sand, bricks, water, etc. It is the second class of lever as a classified simple machine in science. It has geometrical significance too, as you can see in the figure, there are several straight and curved lines. The joints between rods are the different angles. The shape of the upper side of the bucket is rectangular. There are different-sized circles on the wheel. It also has triangles and parallel lines, etc. It has two handles with which the tool is pushed to make it move. The machine is useful to ease our day-to-day work because this can carry more than what five-strong men carry. So, geometrical concepts embedded in this tool can be learned and taught contextually. Regarding mathematics, the wheel can be used to learn the concepts of circle and trigonometry; the body parts of it can be used to learn the concepts about area and volume, etc. Regarding science, the tool can be used to learn the concepts of the simple machine, the functions of these tools, and invention, etc. Similarly, another tool is a shovel. It is used in the brick factory to manage sands and mud. This is the third class of lever as classified in the simple machine.

Figure 23. Wheelbarrows

Mathematical Patterns (1): The Piles of Bricks. The shape of piles of bricks is another amazing geometrical or mathematical pattern to explore. Some of them are very linear and others are curves in nature. This pile contains the bricks which are in the final stage to take them to the factory. Hence, the pattern is amazing to understand the supportive system. Interestingly, the total number of bricks in a pile can be found out by knowing the number of bricks in the first line and then multiplying them by the number of lines it has. Next, the patterns and geometrical shapes found in the rows of bricks are other amazing things to explore. Generally, they are made on the ground with a particular order of lines (see figure). The nature of such patterns is really beautiful to explore. I usually got interested in predicting the number of bricks and comparing their values with the real number of bricks. Most of the time, I was able to speculate approximate answers.

Figure 24. Piles of Bricks

Mathematical Patterns (2): The Lines of Bricks on the Floor. This is another pattern of bricks made on the floor. The lines are usually in a straight line or curvilinear form. Thus, these lines represent the curves of the different functions. There is an equal gap between two bricks in a line and equal space among lines. This is an amazing pattern to explore. There are mathematical concepts such as lines, symmetricity, patterns, functions, etc. Similarly, the

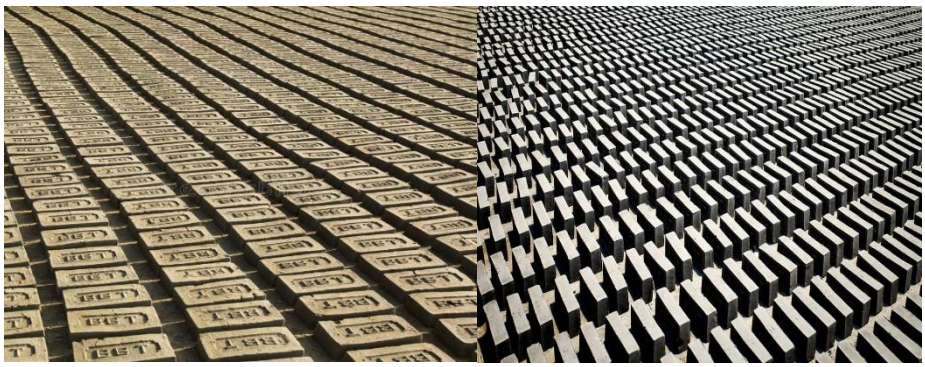

Figure 25. Patterns of bricks on the floor

clay kept on the ground has a linear pattern. The clay is kept on the ground very systematically to ease the brick making process.

Kodali. This is another technology that is used to ease the work in the brick factories and other fields such as farming, especially for digging the fields. In the brick factories, this tool is used to cut and carry the mud and clay. This is made of iron and cylindrical wood that supports to carry things. The iron blade is fitted to the wooden handle which makes an approximately right angle. The tool or artifact itself consists of mathematical ideas such as perpendicular lines, parallel lines, cylinders, 2D flat surfaces, etc.

Figure 26. Kodali

The shape of the chimney made by using tin was/is conic in nature which was built to pass the smoke of coals and woods. However, these days, cylindrical chimneys made up of a mixture of cement, bricks, and sand (modern chimney) are popular. Similarly, there could be seen many strange shapes in the working field. Some of them were rectangular, square, and many more.

Figure 27. Chimneys

Therefore, I had abundant materials to learn geometry in constructive ways. By observing them as well as manipulating them, I could develop a conceptual understanding of geometry.

Home Arithmetic (Mensuration) in my Brick Making World

As far as I remember, I was extremely inquisitive during my school days. I, to some extent, tried to link those academic contents and concepts to my world around as much as I

could. But that was limited as I was not so much aware of the practical implications of those ideas in my day-to-day life. Nevertheless, by reading definitions I used to try to connect some of the ideas in the real-life contexts. One of many examples was relating perimeter and area.

It could be any day in 2005. I was in one of the brick factories in Bhaktapur district when I was living with my family. This was the time when I was in grade eight. I was reading the definitions and solving problems regarding the area and volume of some standard figures such as rectangles, squares, and 3D objects. I was curious to learn those things practically. So, I made up my mind to implement the concepts in the stuff around me. I took the measuring tape (I knew how to measure) and then went to measure the length, breadth, and height of rectangular and square-based objects such as piles of bricks, ditch, my own home made by bricks and tin, the bricks, etc. I tried to find out their perimeter, area, and volume by keeping them in the given formulae. However, I was confused with the standard figures because those objects were not the same as given in the textbooks. I was quite happy that I could find out these things by myself doing experiments but still unaware of the standardization of the objects. One of them was the shape of our field which was used to make bricks. The shapes of these fields did not match with any of the given figures such as rectangle, triangle, circles, etc. I was trying to see where the length and breadth of those objects are. I could not find the perimeter, area, and volume of such objects because they did not have length and breadth. I wondered how I could find the volume and area of such objects which had no exact length, breadth, and heights as shown in the books. However, while doing so, I at least could learn

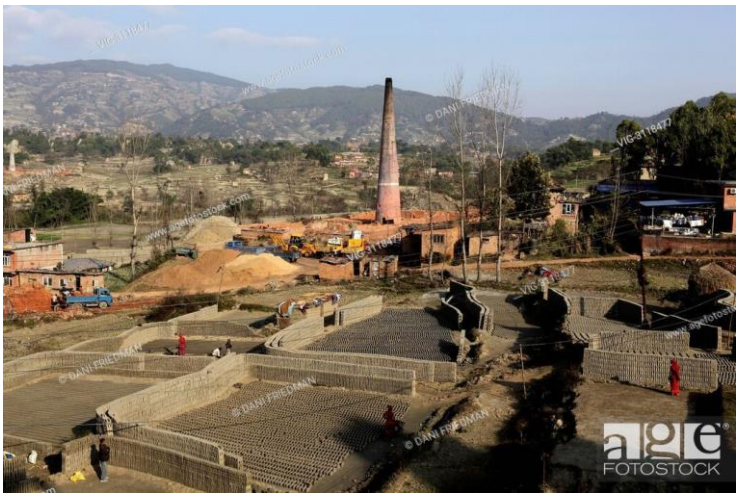

Figure 28. Scenery of one of the brick kilns

how to measure the side length of such a figure. In doing so, my father helped me to measure the entire side length of this ground. He also supported me to keep the measuring tape all around the field. At last, I added all the lengths of such irregular land. I was astonished. I did not have any idea about finding the volume of such irregular ditch we made.

I could find out the volume of one brick and multiplying or adding, the area and volume of many bricks. I was somewhat able to assume and predict the number of bricks needed to make the homes, the volume of the piles of bricks, the capacity of the truck which transports the bricks from the factory to respective places, and many more. This way I learned, to some extent, the concept of area and volume contextually.

Out of several concepts of mathematics at the school level, the concept of perimeter, area, and volume are likely to be considered the most foundational which might come after the basic knowledge and skill development in numbers, basic operations, lengths, weights, etc. Since it was/is in the coursebook of mathematics, I was also taught these concepts in primary and middle grades. Whilst studying these concepts, I perhaps was presented with some static definition of perimeter, area, and volume of the objects, and lots of routine problems to solve (see chapter III). The problems seemed to be static/routine/muted/old having no body and soul. These problems might have been solved by my several seniors. When I was bored, had mathematical anxiety, I used to ask, *"Dear Math, how many people do you need to solve your problems? My several ancestors and seniors solved these problems. Now, you are presenting the same problems to me to solve. When do you satisfy? I can solve my problems such as fixing my school bag, cleaning my clothes, doing several household works, working laboriously in brick factories. Why do you not solve your problems yourself?"*

Concrete materials and artifacts seem to be essential for every learner to grab the deeper sense of mathematics through which the learner all his/her senses in the process of

knowledge construction. The materials are likely to be prior conditions for holistic learning experiences and some phenomenal constructivist approaches like CRA (Concrete, Representational, and Abstract) with its emphasis on the significance of materials usage. Arriving at this point of inquiry, I am raising some critical questions here. *Have you ever felt an incremental or huge difference during the time you use teaching materials? How did your students react?* Remember your learning experience using materials to learn geometry for the first time. *How was your genuine experience? Did your teachers or you yourself prioritize the materials while teaching, where was/is the problem? Who is irresponsible for this? Are we as teachers destroying our students' creativity by not providing them with opportunities to by doing and playing?*

I hope you might have gone through my one non-academic world: Brick Factory. Shading lights on my second research question, my world in the brick factories seemed to be extensively powerful for making my learning journey meaningful by connecting the concepts with real-world scenarios. By connecting my academic and non-academic world, I could learn mathematics and other subjects conceptually by solving my real-world problems. The context and resources available in those brick factories could/can make every learner stay connected with learning and lifeworld. For developing rich experiential learning, the interconnectedness of learning and context appears to be essential. Most of the holistic educators (Dewey, Pestalozzi, Froebel, Steiner, Montessori), who advocated for experiential learning claim for the need of the integrated, interdependent, and interrelated learning for holistic learning. They claim that learning occurs naturally in this environment as learners interact with the world, draw connections, seek relations, and construct meaning. For Dewey (1940), learning is an act of thinking; and thinking as a process of making connections and forming relationships; a process of making and connecting links explicitly in the form of relationships. Pursuing Dewey's line of thought, I also consider that experience awakens

learners' curiosity and incites them with a desire to understand the phenomena, consequently, learning can happen through a process of connections. So far, this might be becoming so necessary that learning has to be connected with the cultures of students as they live in today's context of a huge gap between learning and practical applications. Here, my position is that by providing students with a rich context (environment), which might be fundamentally required as to most of the constructivist thinkers, students can make relationships with their learning and thinking wherein they can observe, interact, and learn.

The resource materials that I discussed in this section are associated with my cultural artifacts. They are embodiments of culture in the brick factories. Thus, as far as the academic world is concerned, these might be examples of ethno-modeling. Ethno-modeling is considered as the artifact having educational value prevalent in a certain culture of people. This is integrated into ethnomathematics – the intersection of cultural anthropology, mathematics, and mathematical modeling, that helps students translate diverse mathematical ideas and practices found in their communities (Rosa, 2000; Rosa & Orey, 2010). This seems to be an evolving branch of mathematics that uses the manipulations of models (or ethno-models) of reality and modeling as a strategy of mathematical education. In this perspective, ethnomathematics lies between cultural anthropology and institutional mathematics that 'utilizes mathematical modeling to interpret, analyze, explain, and solve real-world problems or mathematize existing phenomena' (D'Ambrosio, 1993, as quoted in Rosa & Orey, 2010, p. 17). In this line, the models I interacted with within my culture of brick factories have mathematical significance for modeling the various concepts of mathematics to learn in a meaningful way by solving the existing real-world problems.

Nevertheless, I observed that my academic world (see the previous chapter) was possibly not much aware of the richness of my cultures and embedded ethnomodels. Until my bachelor's degree, I probably did not experience such phenomena wherein my teachers used

to relate contents of mathematics and other subjects to the models as pedagogical tools with which I used to have deeper physical and psychological connections. Here, it could be apt for discussing the decontextualized nature of learning experiences that our school or entire education system is providing. In this line, learning appears to be detached from the cultures of learners ignoring and disrespecting the dynamism of multicultural value. *Why is this happening? How can the education system value cultural and context integration? How/why do ethnomathematics play an effective role to combine the cultures of students and mathematics?* In the next chapter (see chapter V), I discuss some of the ideas regarding fund of knowledge, culturally responsive teaching and learning, and ethnomathematics to address some of these emerging questions.

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Take a break!

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My World of Arts: Can Education Reach?

How do you feel when you see paintings on the walls? On the grounds? On the digital screens? How do you react when you listen to songs? How do you interpret your feelings and other emotional attributes when you listen to songs or watch videos, movies, or drama? How do your body parts react when you see others dancing or when you are dancing? Can you interpret your feelings when you develop something that looks beautiful to you? What are arts for you? Who is an artist for you? Are you an artist? If you are, what did you make or would like to make? Where did you use the arts in your living world? There are endless such questions that I can ask when inquiring about arts and their implications in human lifeworlds. I believe that arts have been an integral part of human lives since their existence. It could be by default embedded in our activities. When I see/observe an artist and his/her activities, I feel like he or she must be creative. *Do you feel the same?* If so, we can agree that artists are

creative and innovative people. But our education system seems to be ignoring arts in our learning assuming them as separate disciplines or matter. *Why are arts likely to be detached from the so-called difficult and important academic subjects like mathematics and science? Can it be that we do not want our learners to be creative and critical?*

One of the emerging debates on ongoing educational discussions is the integration of arts in teaching and learning practices which is one of the major principles of holistic education (Nakagawa, 2000) from the Eastern worldview of holistic education which are the primary means for self-transformation by pursuing the higher self. Similarly, from the Western worldview, experiential learning integrating arts is the primary means to reach the holistic development of a person (Forbes, 2003). The recent development in education with the prioritization of arts-integrated learning such as STEAM education seems to be creating an authentic environment for blending arts to cultivate creativity in the learning experiences of students for holistic development. In this emergent context of integration of arts in learning, this inquiry also aims to discuss my lived experiences focusing on several forms of arts and their educational significance. Now I would like to welcome you to my world of arts.

I have been experiencing and exploring arts from my childhood to this stage. I must say, arts have been an integral part of my living world. I grew up with several forms of arts knowingly and unknowingly. There are/were language arts, visual arts, performative arts, movement arts, etc. So, in this section, I discuss some of them by emphasizing their educational, in general, and mathematical, in particular, values embedded. Through this, probably you can be aware of what/how/why arts are necessary to integrate into students' learning context from early schooling.

The clay and Arts

For about 18 years, mud and clay were integral parts of my life. Consequently, there was an immense relationship between the clay and my lived experiences during my

involvement in brick factories. The relationship started with making bricks; constructing several artistic things from those bricks; developing various objects such as birds and other animals, airplanes, human bodies, and other nonliving beings, etc. I enjoyed playing with them. Until my teenage, I used to explore plenty of similar contexts of making, designing, developing, imaging and creating. Additionally, I used to observe several objects made up of clay and bricks such as the houses of laborers in the brick factories, the models made by people inside the factory, the bricks on the head and on the back of people who carry the bricks, and constructions (buildings, bridges, temples, etc.) of bricks. As I reflect on them now, I seemed to have been surrounded by sufficient arts and artifacts that probably shaped and heightened my creative thinking skills since arts and design help people in creativity and innovation (Weisberg, 2006).

It appears that I was surrounded by sculpturing activities which comprised of developing models through clay and bricks. At that time, as I remember, I used to think creatively to make them attractive, to give their actual shape, to apply different colors, and most of the time making imaginary models, alien, for instance. I perhaps used to wonder by moving the parts of the models. For example, I tried to reverse the positions of hands and mouth of the models of the human body. That used to be so much surprising and amazing. Sometimes, I used to make models of different fruits. Things would become more interesting and amazing especially when I manipulated one fruit by adding the models of other fruits. Whilst making the models of birds, I would move the position of their legs, place their heads, and try to make them stand. For this, I used to make the models first and wait until they completely soaked up so that they could stand. That was so amusing. In so doing, I used to move their parts and imagine how they looked like. The practices might be so profound to think both creatively and critically. Perhaps, I also developed a sense of belongingness after building those models.

Sometimes, I used to make the objects just as given in my textbook of mathematics. This activity used to comprise models of some of the 3D objects such as cylinder, sphere, cone, cuboid, prism, pyramid, and other geometrical objects. This used to appear like I was limited to develop these objects and see their cross-sectional surfaces so that I could relate them to the information provided in the textbook. For instance, in the model of the cylinder, I could explore its circular bases and lateral surfaces. This was done the most when I was in grades eight, nine, and ten.

On the contrary, my formal education appeared to make the separation of such arts and formal learning experiences. I still remember that mathematics teachers used to bring and use only geometry box to make figures on the board. Except for this, as much as I remember now, I was not presented with the other materials in the learning activities. *How can a student learn about 3D objects by using the figures made on plane surfaces? Can students move those 2D figures? Can students manipulate those figures? Can students break them and create something different from those figures? Can students grab the knowledge visually? How can students develop an understanding of those abstract figures?* Probably, the answer to these questions is a big 'NO'.

It seems that those figures could have been useful for the students who had already made the conceptual knowledge about their 3D models and objects, but *how about those students who have never interacted with such materials?* These students seem to learn mathematics and other disciplines using their analytical thinking skills being unaware of the several benefits of arts integration for creativity and innovation (Sousa, 2016). Analytical thinking is similar to developing logical-thinking skills or logical-mathematical intelligence as discussed by Gardner (1983) that is likely to prioritize the knowledge through logic according to idealism, thereby controlling the language ability – making a person mere intellectual. So, the models could be interactive to learn things spatially and conceptually,

thereby using all the senses in the learning process according to empiricism or by exploring the real-world application of the ideas and information.

Here, my emphasis is on the integration of sculpturing activities (part of fine art) that might help learners learn creatively. For this, some simple things would be to integrate those activities which include the clay as I did in my childhood. Since our environment is rich in terms of mud and clay as most of the schools are in rural and semi-urban areas, the activities can be performed inside the classroom or within the school premises. Let's consider the cognitive development and its theory proposed by Piaget (1970) which focuses on learning based on learners' physiological development. According to this theory, the learners who are under 12 years of age need more concrete and playable objects and models to learn mathematics and other disciplines. However, it does not mean that the students of greater age may not need manipulatives because they are likely to improve cognitive skills (Muñoz Oyola, 2010) and support the development of somatic skills. I am not opposing the practice of giving our children the readymade materials such as bicycles, bikes, motors, etc. However, giving them materials like clay might help them to make their own materials of their choices such as potters and sculptures develop things creatively. This is about not giving the fish but encouraging them to catch the fish. To start with, the activities that include clay can be introduced in the learning contexts.

Dance: My Passion for Connecting Self and Others

One of my major interests in arts was/is dance. I was grown up in a family that was/is famous for participating in different cultural programs to entertain people. Since my childhood, I have become a part of it. I was/is good at singing, playing some of the musical instruments, and dancing. Among them, dance was/is my favorite. I participated in numerous cultural programs that happened in my localities and brick factories. Whenever I listen to music, my body, heart, and mind start reacting. I get activated to perform. This ability would

become one of my friends, particularly when I became happy or sad to express my feelings. I learned numerous steps of performing different forms of dance by seeing others, mimicking them, and practicing. The opportunities of watching movies and videos improved my skills in dance. Later, I also explored various dance skills extensively by watching YouTube videos and tutorials. This way, I could develop skills in several dance forms such as local dances, Bollywood dance, Robotic Dance, Break Dance, hip-hop dance, etc. Previously, I followed my passion to entertain myself and other people. But at present, I have understood the value of dance for the holistic development of a person during my MPhil in STEAM Education at Kathmandu University. I explored the importance of dance in learning and thinking through various research studies. I was surprised to know that dance helps an individual by activating the major neural networks of our brain (Sousa & Pilecki, 2018). Similarly, dance is likely to help in connecting the mind, hearts, and body. This is a form of expression that may be a type of performing art, part of a special ritual, or a fun social activity. Moreover, dance is a language of shape, space, timing, and energy that can communicate ideas and feelings (McTighe & Wiggin, 2013).

While exploring the benefits of dance in learning mathematics. I explored how/why dance can be integrated into the interdisciplinary framework of learning to enhance mathematical abilities. I also explored that dance is useful for teaching and learning geometry such as 2D shapes, angles, as well as 3D models. Different moves in dance might be used to represent several types of functions and their curves (as shown in the figure). Similarly, dance is

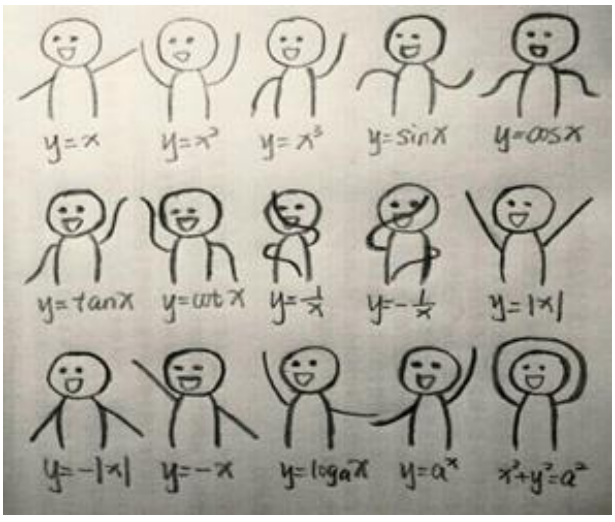

Figure 29. Various dance moves representing functions

also useful to teach the concept of symmetry. Different moves in dance form depict the symmetricity of shapes and objects. While doing so, geometry comes alive for students when they experience it firsthand with their bodies (Kaufmann & Dehline, 2014). The ability is also imperative for people to accelerate their kinesthetic intelligence as suggested by Gardner (1983). With its immense benefits in human psychology as well, this seems to serve the education and particularly mathematical understanding. Moreover, I experienced that the emotional attributes can be expressed through dance performances. I use dance as my passion; my skill of entertainment; and most importantly to release my pain, stress, etc. which significantly increase my productivity. I use dance to activate myself which motivates me to do anything I wish for. This also helps me to think creatively in terms of generating noble ideas and turning them into meaningful actions. For instance, when I am working on some projects and feel embarrassed or something difficult, I dance for a few minutes. The next very moment will be outstanding because I become so fresh and can think creatively. Therefore, my dancing ability is another huge asset for me to link learning and dance while educating people. In this, I am envisioning an arts-integrated pedagogy to promote the benefits of arts integration in maximizing the learning abilities.

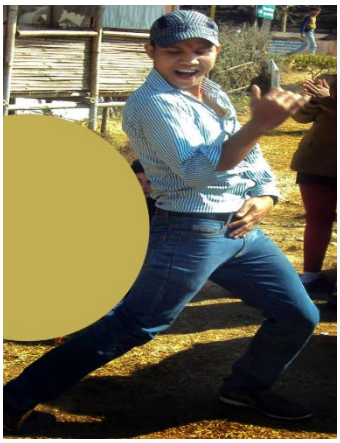

Figure 30. I am dancing

Similarly, my abilities in playing a different musical instrument are the skills to link education and arts thereby connecting them in an interdisciplinary landscape.

Being a Waiter: Exploring Arts in Restaurants

Some significant years of my involvement in different restaurant and party palaces as a waiter (see Waiter Pedagogy in chapter III) could provide an immense platform for me to interact with different forms of arts. I could develop a sense of aesthetic values that are supposed to be the parts of our lifeworld as human beings. I could develop artistic skills such

as putting things in a particular order to attract people as well as managing things in beautiful manners. One of them might be arranging napkins of different colors in a beautiful pattern and keeping them on the respective tables. Every day, I would change the patterns of keeping napkins, arranging flowers, and putting other things such as astray, glasses, spoons, plates, etc. These are for attracting customers. Similarly, there were different artistic patterns of putting foods on the table and the tray, attractive ways of managing tables and chairs, gorgeous ways of keeping various items, to illustrate but a few. In these tasks, mathematics is inherently embedded because I used various patterns, proportions, ratios, fractions, etc. to arrange those things. This was another non-academic platform for me that could contribute to meaningful learning.

Figure 31. One art/design found in a hotel

Art and Design with ICTs

After completion of my 10+2 (grades 11 and 12) in mathematics education, I was looking for developing some computer skills as I had done my basic computer course. My interest was to do a diploma in computer and particularly to develop skills of designing which encompass Photoshop, PageMaker, Freehand, and other courses. I was curious to learn how to beautify things and give them the aesthetic values of those products. Giving aesthetic value was/is likely to be making things brilliant from the perspectives of art. For instance, the photos or images made by Photoshop or other photo editors seemed to be attractive for the people. Because of my interest in designing stuff through developing the skills related to design, so far, I joined one of the institutions.

I started learning about arts and design using software and editing tools. Oftentimes, I was surprised to know that these tools were useful in learning mathematics. With this, I could develop higher-order thinking skills such as applying, analyzing, and creating according to

Bloom's revised taxonomy (Anderson & Krathwohl, 2001). Moreover, I was proud of myself because while making, designing, or constructing novel products myself. In so doing, I was able to find my strength or somewhat the answer to 'who I was. The context of developing designing skills in computers appeared to be effective for me to think creatively while constructing materials, giving them a particular shape and size, selecting colors to make things beautiful, instilling some lively attributes, and finally, doing the culminating works to finalize those kinds of stuff. Moreover, I enjoyed it a lot when I was able to apply my ideas and make brilliant things.

I enjoyed the process of building something new every day. Myriad activities done for developing and creating such products were likely to be fascinating for me to create intrinsic and extrinsic motivations for me to move to each next task. I was surprised to know several mathematical contents while designing such materials. For example, the selection of right dimensions, apt geometrical shapes, the required proportion of colors, the appropriate places (direction) for things to put in designs, the selection of required brightness, the required amount of visibility, the use of vectors in design, etc. These are some of the concepts of mathematics that fundamentally appears to be useful to develop in the earlier school education of a child. Oftentimes, people use these fundamentals of mathematics in their daily lives, but it seems that this has not been incorporated in our formal education because the general public has not got access to it.

The images created using ICT platforms leading to learning through pictorial representation are related to visual arts. This helps to develop representational knowledge (Rittle-Johnson & Schneider, 2015) which is associated with conceptual understanding. This knowledge can be related to linking the concept to pictures, images, mental models, or any other objects. Here, the integration of the visual arts comes into existence. Besides the help of ICTs to build pictorial representation, drawing, sketching, constructing, and designing

pictures on notebooks could help learners to be more creative thereby developing their higher cognitive thinking, affective, and psychomotor skills in the learning context. Feasibly, ICTs seem to be making these time-consuming things easy and lively. More so, there we could find massive online and offline platforms to get the visual representations free without creating. Creating such things might significantly help learners develop their knowledge and skills holistically. These need the skills to use digital devices, to play with the software, to correctly insert the required things, and finally get the product. In this age of technological innovation, ICTs skills seem to be evident to master. In other words, these skills appear to be crucial for both teachers and students to survive in this digital age.

Here, technological tools and digital platforms appear to become so powerful to learn new skills. In our day-to-day life, we are probably in favor of using beautifully designed things (one of many is the interior design is being popular in modern days). Stuff like the photos, images, postcards, visiting cards, menu cards, marriage ceremony cards, invitations cards, and so on are the essential parts of our life. In the contemporary world, people seem to be attached to such stuff as they have fascinated us. The design skills might have become the most essential to develop aesthetically rich stuff. The increased interest, need, and priority towards such stuff have played an immense role to help people design activities to sustain economically. For me, these activities done with the support of designing software were my interest and the demand of the time. Perhaps, I used to be more creative in terms of developing aesthetically sound stuff by implementing diverse sources. Next, I could apply these skills when I was starting my entrepreneurial activities. In my world of being an entrepreneur, I had/have to implement various arts-based products. These are for people's needs and interests. So, as per the demand of the fast-growing world, we have been using such materials to attract them.

In this section, I presented my lived stories experienced in various forms of arts, thereby discussing their educational significance, particularly their benefits in learning mathematics. The objective of this entire discussion was to make readers aware of the potential benefits of arts integration in learning contents and tasks performed inside and outside the classroom. I also reflected on how arts have been made optional in the schools or discarded to provide platforms for arts related activities (see the section *this is not your art class* in chapter III) in the context of Nepal. The context is evident for showing the picture how tomorrow's creators' creativity is killed by focusing only on 'most important' subjects and assessments. Arriving here, I assume that, without making it optional or separate activity, it should be kept as a part of everyday learning activity. In this regard, at least using songs to memorize formulas can make a huge difference. For instance,

Making the profit, making the loss, with breaking the ice!

Profit happens when SP is bigger than the cost price!

Loss happens when CP is bigger than the selling price!!

Wow! This is so nice!

But! How can I calculate them?

Subtract CP from SP for Profit

SP – CP is for loss indeed!!

Profit and loss happen in a transaction

But how can you get them without doing the action?

Similarly, a story-telling approach can be one of the pedagogical approaches to make learning interesting and students inquisitive (Peleg et al., 2017). This seems to be effective to cultivate students' creative thinking skills. In my school days, I was gigantically interested in reading and listening to stories. I used to listen to the stories from my grandparents and sometimes from my parents. While reading stories in language-related books could make me

active, inquisitive, and imaginative. But I probably did not experience stories in mathematics and science. In this phenomenon, it is good to write here that our over emphasis on particular subjects and particular future (singular future) plays or played a vital role in killing students' creativity. In this neohumanist world, the arts seem to become the connectors between the spiritual and the earthly world (Steiner & Howard, 1998). These might be the connectors amongst knowledge, experience, expression, thinking, and learning. Perhaps, these are considered to be essential elements to place the individual rapport with her/his inner self. The spiritual dimension for holistic education has placed arts as its element to human manifestation. Thus, arts might be central to holistic learning. For this, schools can make their students participate in a variety of artistic activities such as painting, drawing, singing, dancing, drama, etc. (Rudge, 2008). Practically, arts are viewed as a means to assist children to delve into their subtle minds and make them more sensitive to the wonders of nature and the mysteries of the created world (Rama, 2000) as well as an avenue to discover the beauty and to develop a sense of subtle aesthetics thereby they are the mediums of learning. Because of these huge opportunities in arts, the schools need to integrate arts across the curricula for fostering holistic education in students.

Arriving here at this point, I have found that my involvement in clay and mud for sculpturing and pottering activities, in the exploration of several arts-based products in brick factories, dancing abilities related to performative and movement arts, and arts through ICTs, among others, might have built a connection to holistic education. The assumptions such as arts for spiritual awakening (Nakagawa, 2000), for emotional intelligence, for physical development or kinesthetic intelligence, for cognitive development; arts for interconnections of human life and cosmos; arts for reverence for nature/life (Rudge, 2008); arts for human uniqueness and wholeness; etc. seem to be central to holistic education. So, my focal discussion here is that arts could/can help learners in their overall development.

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Take a break!

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My World of Games

I played several games while working in the brick factory as a child. These games seemed to be unique because children out of brick factories might not have experienced them. The first game was making a handy vehicle (as shown in the figure) by using a stick and a tire of a bicycle or anything circular. Now, my job was to push the tire with a stick so that the tire could move on the road or any other lateral surfaces. Whenever I got time, I could enjoy playing this game. Whilst playing this game, there seemed to be a collaboration among us. The game was entertaining because I enjoyed watching the movement of the tire and following it. If were free, we would go far away with playing it. The next game was playing with the wheelbarrow. I used to put my sibling(s), bricks, or other materials into it and push it by lifting its two handles (go through the above section to see the wheelbarrow). another game was the game of marbles. I used to play this game with my siblings and other friends. Sometimes, I used to win/lose marbles while playing. The next game was to imitate the actors and actresses. I watched many movies in my childhood. The game used to be characterized by the imitation of those artists in the movies. We used to play the roles of different characters – a kind of role-play activity. I used to love to become a hero in every play.

Figure 32. Playing with tire

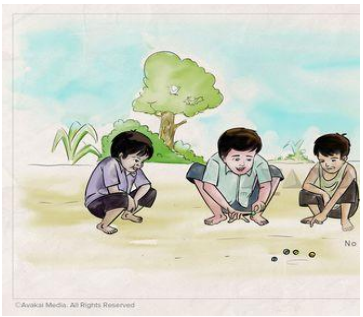

Figure 33. Playing marbles

https://en.wikipedia.org/wiki/Dandi_biyo#/media/File:Dandi_biyo.gif

Figure 34. Children playing Dandi Biyo

When I was in the hometown, I used to participate in several local games such as dandi-biyo, kabaddi, chungi, volleyball, football, baghchal, etc.

Arriving at this stage of inquiry, I am wondering how I can discover the educational significance of these games in a multi/interdisciplinary learning context. I am also pondering on how/why games enhance the learning abilities of students. This refers to game-based learning. Game-based learning is a pedagogical approach to integrate one or many games to teach the academic disciplines wherein teachers deliberately design learning activities to introduce concepts and guide them to construct meaningful understanding with the help of game(s) (Plass et al., 2015). Game-based learning (GBL) or games integrated learning seems to be crucial for students' motivation and active engagement in the learning process which positively impacts on students' academic performance and achievement (Karakoc et al., 2020). Besides traditional games and because of rapid development in science and technology, there are hundreds of thousands of digital games available that might be integrated into learning activities. The approach is similar to learning by playing. For example, when a teacher is teaching about shapes, s/he might use volleyball or football games so as to teach various geometrical shapes and mensuration. With such activities, students are likely to be able to connect learning contents (multidisciplinary) with the games they are playing, and they also might develop their psychomotor skills, moral and social skills, and many more, as a result, can be helpful for holistic development.

At this moment of inquiry, it seems that my learning was detached from my experiences with games related activities. The learning scenario might devalue my experiences in games and activities. For instance, in mathematics, there was the figure for football and volleyball, but pedagogy did not appear to allow us to play football or volleyball. I was amazed when I used to count the number of turns that my tire made while going from one place to another. However, my learning context did not allow to experience of playing

tire and count the turns to evaluate the total perimeter and other problems while solving the problems in arithmetic, mensuration, and trigonometry. I could solve the problems involving the spheres of different dimensions but could not find the volume and area of those marbles with which I used to play day and night. Even more, I could not figure out where the radius of the sphere was. This means that my learning context seemed to be beyond my living world and my world of several games. Perhaps, the games I played had an inordinate significance in learning not only mathematics but also other academic disciplines.

Games are worthwhile in mathematics learning as Pradhan (2018) argues that games provide a variety of opportunities in mathematics learning such as mathematical language, problem-solving skills (creating strategies, collecting, organizing and analyzing information) through which students develop mathematical ideas thereby sharpening their mental coordination and ability to communicate and share ideas with other. I agree with Pradhan in terms of the benefits of games that are likely to be essential for students to explore mathematical ideas by relating them to real-world problems. Similarly, games seem to help learn in interdisciplinary settings.

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Take a break!

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My World with ICTs

The world might have come to a rapid modernization with industrial revolution 4.0 characterized by emerging digital technologies, artificial intelligence, robotics, DNA mapping, nanotechnologies, biotechnologies, the internet of things, and 3D printing (Infosys, 2016; as cited in Luitel & Taylor, 2019). Technology seems to be leading this world at the

speed of light. Looking back to the development, "to reach an audience of 50 million people it took radio 38 years, television 13 years, the Internet four years, and Facebook only two years" (Fadel et al., 2015, p. 10). This shows how hurriedly technological fields are growing. Given this context, my involvement in using ICTs might not have been separated.

Although I was born and spent my childhood in Net Generation which is also known as Generation Y or Millennials (Tapsott, 2009, as cited in Donovan & Green, 2014), my childhood could survive in the generation where radio was everybody's access, urban people had access to television, very few people had CRT computers and mobile phones, and limited people had internet access. Due to my economic condition and geographical location (rural part of Nepal), I spent my early age listening to the radio. Fortunately, I had an environment to watch movies whilst we were in brick factories. I, sometimes, enjoyed the educational programs conducted through radio might be helpful in learning for students. This was called 'Radio Education'. I am recalling here some of the radio education programs conducted by Radio Nepal. I used this device to get the news and listen to songs etc. At the age of 14, I got a Walkman – a device to listen to various FMs. Still, telephones and mobiles were not in my accessibility. Only after completing my SLC and working in a restaurant as a waiter, I was able to buy my first keypad-attached cellphone. Since then, the communication with my loved ones had started. During my 10+2 in mathematics education, I grabbed some basic computer skills. At the same time, my interest in using ICT devices led me to buy a LED computer. I, then, started learning several things on my own and sometimes getting help from experts. During my bachelor's in mathematics education, I dared to buy my personal Dell laptop. To this date, I have been able to enhance my knowledge and skills of computers. Also, I could do intermediate on the computer, develop some graphic designing skills and the skills of using the internet, etc. After joining KUSOED, my accessibility to different ICTs devices and platforms was likely to be significantly increased.

These are my lived experiences of using several technological devices. This perhaps represents that I was interested gradually in accumulating advanced technologies, developing my skills in those devices, and applying them in my areas of interest. Till my bachelor's degree, I used these devices to listen to news and songs; store information; watch videos and movies; develop basic ICT-related skills such as skills of using radio, mobile phones, computer, etc. Oftentimes, I used these devices for my entertainment purposes. Grabbing information from news and other radio programs, in my childhood, could help me in my learning such as being aware of various social issues and incidents. On top of that, the use of mobile phones would help me in doing mathematical calculations, storing information for future purposes, and conveying information through communication. The computer skills would become my assets to work diverse work in my personal and professional contexts. Graphic designing and advanced computer skills might have been powerful for me to do personal and professional work. Nevertheless, it seems that I was unknown about the huge benefits and usage of ICTs in educating people until I entered Kathmandu University.

ICT literacy is considered as one of the fundamental 21st-century skills. Holistic education also incorporates the critical awareness and ethical use of technologies in the context of learners' lives in its assumption (Flake, 1993). Given this context, my non-academic world seemed to be rich in terms of the usage of various technological devices in my daily activities. Un/knowingly, I was interacting with them to educate myself and develop the most essential skill in this era of incessant development of science and technology--the Generation Next or Generation Z and Generation M (Multitasking) (Donovan & Green, 2014). These might be the generations representing the time from 1998 to the present. This is the generation where students were born into a world that already has a computer and other digital technologies in every context, they live in. Computers and the internet are the facts for students who were born in this generation. However, till I completed my bachelor or BEd in

2014, it seemed that, as per my experience, most of the people were unaware of the intense benefit of ICTs in teaching and learning.

After I got my computer and laptop, I started learning basic things with office applications, playing songs, watching movies and videos, playing games, and reading available books, etc. that could facilitate me in self-regulated learning. I started learning to edit videos and songs using editor software. In this, I had developed some basic skills in computer applications, software, and hardware. Because of my personal computer, I had opportunities for learning new things on my own and by getting support from others who scaffolded my knowledge and skills in computer literacy. I tried, made errors, learned from my errors, reflected upon my learning of developing skills in computers, and finally learned to be more skilled. However, the inaccessibility of internet connection or access to getting information, learning from online resources and people across the world, and guiding my journey of developing skills of ICT confined me within the traditional use of computers.

In 2010, I explored various ideas about history, ongoing phenomena, science, and technology, etc. when I had internet access. Before this, I had only heard about Google, Facebook, YouTube, to illustrate but few. Only at the age of 19, for the first time, I searched something on Google. That was an extremely fascinating moment for me because I was using the internet for the first time and search-engine like Google was new to me. At the same time, I watched some videos on YouTube. I went through my friends' Facebook page (I did not have my account). I cannot express how happy and curious I was at that time.

The formal academic context parallel to my involvement in computer and digital devices was likely to be beyond the use of digital technologies (see chapter III). ICT might be detached from my teachers' instructional activities – limiting to teacher-centric lecture methods of learning. In such conventional ways of learning, I might not be aware of how ICTs help learn and construct meaningful learning experiences. Sometimes, I felt that I was

wasting my time on unnecessary things because I had got a job of practicing rote questions on notebooks. I had to do a parroting business and a sacred copying-pasting job. Except for some people who had computer skills (they are not from a mathematics background), I could not ask my teachers about learning mathematics conceptually using computer-based software.

Once, when I was at bachelor level in 2012, I asked one of my mathematics teachers about this. I remained surprised by his response. He might be saying, *"You have a computer? Oh, that's good. But I don't have a computer and the internet kind of things. You should ask the computer teacher not me. I don't know how those things work. So, better you solve questions time and again. That's the only way you remember lots of things."* The response was epic. You must have experienced such things in your learning journey. At this moment of inquiry, as I reflect on this incident, this teacher did not have a computer and probably did not know how mathematics learning is possible through such devices. They seem to be still in the 18th or 19th century who are teaching using 20th-century pedagogies to 21st-century students like us. Technological development is crossing every boundary, the only thing that appears to be as they are: teachers. The context is well known for most of us. I too had developed some ICTs skills but could not implement them in supporting my learning of mathematics and other subjects.

At the same time, I oftentimes replicated the ways of learning by imitating my teachers' methodologies in the context of my teaching. However, I tried to be somehow radical or different from them. In terms of using ICTs in the classroom, it was almost impossible to use technological devices such as laptops and computers or projectors. But I tried my best to use mobile phones to show my students the concepts of mathematics visually. This followed the use of designed materials such as pictures or videos available in different web-based sources. I used to show them the 2D and 3D pictures through my mobile phone and explain the rest of the stories. In so doing, they used to be excited to learn new

things every day. Since I could not use the computer, I was not able to show them what I designed or developed. At my best, I tried to change the tradition of teaching my students. This made me a different teacher from others for them.

This overall scenario I just depicted presents an idea that my non-academic world seemed to be filled with digital technologies and ICTs knowledge and skills. This perhaps shows how much this world of mine could transform the education system from conventional to embrace more modern or progressive methodologies led by constructivism of learning by ethical integration of information, communication, and technology. I had a rich environment of connecting and constructing ideas through the usage of various ICTs platforms. However, my academic world (portrayed in chapter III) might have no/limited space for such integration. The non-academic context where I interacted with ICTs could help develop me as a holistic learner. Observing the present context of education, I experienced that the situation has been changed and people are extensively using digital platforms in education. I take this as a great improvement although there are several issues in the ICT-integrated education which I discuss in the next chapter.

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Take a break!

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My Entrepreneurial World: Let's Turn Ideas into Actions!

Because of my poor economic background and after completing my bachelor's degree in mathematics education, I had to take tuition classes of mathematics and science for the students of grades 9 to 12 at Manthali, the headquarter of Ramechhap district. I was called 'a genius' of mathematics because of my earlier successful and outstanding academic achievements and performances. In 2014, I could earn some money by taking coaching and tuitions classes from early morning (at 4/5) to the night (approx. at 8/9). After this, I wanted

to do a business for uplifting my family's financial status thinking that business was/is the best option to do. In this regard, the saying, 'Newar is for doing business' is relevant to me. According to Hindu tradition, Newar lies in Baishya or merchant: who is for business. In this situation, I explored different options for doing business such as starting a cloth shop, a restaurant, etc. Since my experience of doing work in different restaurants and party palaces in Kathmandu Valley, I decided to start a restaurant. However, I could not start this startup alone as I did not have sufficient money as well as other financial support. In this, I requested one of my maternal uncles, who had several years of experiences in this field as a waiter and bartender, one of my brothers who had 4/5 years of experiences working in this field as a chef, and other two people who were engaging in the same field. They also wanted to start their own business because first, they have quality knowledge and skills in their field, and second, they wanted to earn money by serving people. We had several days of conversation in starting up our partnership in a business, collecting a sufficient amount of money, searching for a better place for the restaurant, etc.

Finally, we could find a place to start our restaurant in the heart of the capital city of Nepal, Kathmandu. Since this was a collaborative venture, we collaboratively set up things as required for the restaurant such as several types of foods, vegetables, beverages, cooking tools and items, chairs and sofas, tables, freezes, etc. The next thing I did was designing visiting cards, pamphlets, and posters for the advertisement, menus, and pictures of foods. My skills in arts and design in ICT platforms assisted me to accomplish these tasks. The skills I developed during my involvement in several restaurants and party palaces as a waiter assisted me a lot. My experiences, in these places, of collaborating with people, communicating with

Figure 35. My entrepreneurial setting

them to accomplish the tasks, and of several management skills eased my workload. I could fulfill the given responsibility efficiently. This way, we started our business.

However, we faced challenges in the starting phase in terms of advertising our startup, leveling up the quality in services including the foods we served, communicating frequently with customers, and getting feedback from them. But later it became the reference for us to improve our quality in services, managing the staffs, and most importantly taking risks in conducting business. In this part, since I had a greater education level than others, I took more challenges in managing everything including the accounts. Next, there was a challenge for me to communicate with other businesspersons from which we used to buy several materials such as drinking items, meats, vegetables, and different types of foods. However, I did it. In the very beginning, we faced so many challenges in terms of handling our ongoing business and leveling up the services. We suffered from financial impediments oftentimes in the beginning years of our business. We also took some financial supports from the banks and financial institutions in some interest. However, we were able to make profits and continued to conduct our venture. After two years, we were able to open the other two branches of our restaurant and able to provide jobs for more than 30 people. Most of these people were/are continuing their higher education by managing time in both restaurants and college. Every month, we all sat for reflection so that we could improve all the quality services to make more profit. Meanwhile, each one of us did self-reflection. We tried to learn from our mistakes. Hence, our experiences could be our teachers for improvement.

The scenario seems to be associated with entrepreneurship which is one of the 21st-century skills. This is probably a result of entrepreneurial learning. Rae (2009) defines entrepreneurial learning as learning to recognize and act on opportunities and interacting socially to initiate, organize, and manage ventures. I, somewhat, developed this skill by considering a Nepali proverb *'padhera vanda garera janinxa'*. Because of my experiences

working in brick factories, I was not limited to the four walls of schools. I had got ample opportunities to explore multiple knowledge and skills regarding entrepreneurial skills such as communication, collaboration, critical thinking, risk-taking, the ability to turn ideas into actions, etc. Similarly, I had a soft corner for serving people because I was the one who suffered the optimum economic challenges. My interest in solving people's problems and working for the well-being or their upliftment led me to do something for them and myself. In this line, entrepreneurial learning is the outcome of dynamic social processes of sense-making, which are not only cognitive but also affective and holistic (Cope, 2005). As an entrepreneur, I could develop attributes such as initiative, persuasive power, moderate risk-taking, creativity, independence, problem-solving, need for achievement, imagination, leadership, hard work, and internal locus of control (Gibb, 1987, as cited in Moustaghfir & Sirca, 2019). MacPherson (2009) illustrated nine common areas of learning content that entrepreneurs should exemplify such as acquiring business-specific knowledge; learning business mechanics; learning about context, customers, and the competition; studying people; studying leadership principles; reflecting on company values; and discovering how to create learning organizations. In my business venture, I am proud that I could develop some of those attributes.

The idea of entrepreneurial learning might have emerged from the business worldview. Later, the concept has been integrated into education and social sciences. I had/have the willingness to integrate my skills and competencies in developing a workforce that can deal with contemporary real-world problems and developing a community of people who are instinct, discipline, adapt, had/have vision, courage and determination, and had/have the ability of risk-taking to make things happen. In doing this, I always wanted myself to be surrounded by a group of people who have gigantic courage to start from scratch to solve people's problems with the help of empowering entrepreneurial knowledge and skills to uplift

them from their hazardous economic and other challenges. However, sometimes I feel like I am making a castle in the air. There is a major reason behind this – our tradition of teaching and learning in a certain discipline which does not have space for entrepreneurial learning and skills.

Entrepreneurial learning is about grabbing the knowledge and skills from the startup of any business venture, solving consumers' and customers' problems in the process of using service and products, to the optimum success of the company or the business venture. Subscribing to Kolb's (1984) idea of experiential learning which is a process by which knowledge is created through the transformation of experience, entrepreneurial learning can be regarded as experiential learning in which entrepreneurs develop knowledge through four distinctive learning abilities: experiencing, reflecting, thinking, and acting (Landstrom & Rosenberg, 1998, as cited in Moustaghfir & Sirca, 2019). This appears as a lifelong process, where knowledge is continuously shaped and revised as new experience takes place (Sullivan, 2000). Entrepreneurship in education is a growing practice of integrating transversal skills (UNESCO, 2015), also called 21st-century skills with the help of innovative pedagogies like project-based learning. However, the practices are limited to school boundaries. For example, I have observed that people from management faculty are not being able to use their knowledge and skills in business. One simple reason is about our educational practices that focus on theoretical knowledge building rather than practical orientation. This indicates the situation of other so-called non-business disciplines that seem nothing to do with such knowledge and skills.

This section depicted how I started my business as an entrepreneur and how/what I learned from my experiences by involving in entrepreneurial activities. Throughout this discussion, you might understand how much I could achieve from my non-academic world of entrepreneurship. This was/is providing me knowledge and life skills that seem to be

extremely essential to survive in this and upcoming epochs. Moreover, you could understand how much such knowledge and skills are useful for us for holistic development. *Do our educational practices have access to entrepreneurial learning and skills? Why? How can contemporary approaches be integrated into learning activities? How can entrepreneurial learning complement the holistic learning of students in this age of innovation? What can be the nature of education to integrate such practices?* These are some open-ended questions I leave for you to ponder.

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Take a break!

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Reflection on the Research Question

Arriving at this moment of inquiry, I think I could address the second research question of this inquiry: In what ways could my non-academic pursuits contribute to my becoming of a learner, teacher, and teacher educator guided by the notion of holistic education? The major objective of this research question was to provide an extensive discussion pertaining to my non-academic worlds that can contribute to my academic world guided by a holistic notion of education. In many ways, my non-academic pursuits as I discussed in many sections and subsections seemed to contribute to holistic education.

The brick-making pedagogy related to my involvement in more than a dozen brick factories as child labor and labor portrays how/why contextualization and interconnectedness are likely to be imperative for a learner, teacher, and teacher educator to construct meaningful learning experiences. This calls for an education system that cultivates a critical awareness of the various contexts of learners' lifeworlds such as moral, cultural, ecological, economic, technological, and political, thereby considering learning as a lifelong process. The presented materials/artifacts, found in brick factories, can play an immense role as a pedagogical tool or

models for meaningful construction of knowledge as well as making learners self-motivated and self-discovery using cooperative activity or participatory methodologies. Next, my world of arts seemed to be extremely rich which had an abundance of opportunities to create meaningful experiences by cultivating creative, intuitive, and imaginative skills. The arts-based learning activities appear to be powerful to encourage the human spirit, awaken spiritual dimensions, and more importantly to connect mind and body. The immense potential of my world of ICTs perhaps has reverence for rapid technological development and their ethical use in education. All the way, ICTs can be used as supportive technological tools to foster holistic learning experiences. Finally, my entrepreneurial world would have full of opportunities to enhance various knowledge and life skills that human beings essentially need in this and upcoming eras for their survival.

In this entire chapter, I discussed the integrated and interdisciplinary nature of education and curriculum that seems to have the potential to blend community and global and cosmos in a holistic educational framework. The integration of culture or lifeworlds of learners for developing rich experiences is what experiential learning is profound for holistic learning. Thus, I argue that an integrated framework is needed in the present system of education. I presented my narratives with substantive discussion to scrutinize my non-academic worlds and their benefits of integrating into academic learning experiences to provide holistic learning. In the next chapter, I discuss how I got an awareness of these ideas, how I can bridge my both worlds, and how I can construct my vision to become a transformative learner, teacher, and teacher educator.

CHAPTER V

UNFOLDING MY POSSIBLE TRANSFORMATIVE SHIFT-IN-MAKING

Chapter at a Glance

In the previous two chapters, I tried to portray my two different worlds by addressing the first and second research questions. Chapter III was designed to discuss my formal academic journey from school to under graduation in mathematics education. The chapter emphasized on in what ways my academic journey shaped my identity as a learner and teacher governed by educationally disempowering practices. Chapter IV was developed to depict my engagement with my several non-academic worlds from my birth to before my MEd in mathematics education. This chapter endeavored to unpack my lived experiences regarding my hardships, challenges, and some successful stories thereby linking them to their potential significance in education to promote notions of holistic education. Now, there emerge some questions: *how did I develop such ideas and perspectives? Did I implement them in my personal and professional contexts? How? How did I improve what I was/am doing? How did I travel (still traveling) this transformative journey?*

So, this chapter V incorporates my shift in thoughts and actions to embrace transformative sensibilities of educational practices thereby addressing the third research question of this inquiry: In what ways have my Masters' and post-Masters' experiences developed me as potentially a transformative learner, teacher, and teacher educator? I am writing this chapter to present my lived experiences of my journey during MEd in mathematics education and MPhil in STEAM education. The chapter consists of incidents, events, dialogues, stories, etc. to portray my ways of becoming a transformative learner, teacher, teacher educator, and research practitioner. I have presented this shift under the

themes: *ICTs: The Tools for Innovation and Empowerment, I Discovered Mathematics in my Culture: Shifting Towards Contextualization, Moving towards Arts-based Living Pedagogy, My Shift towards Progressive Pedagogies, My Possible Shift in Embracing Transformative Curricula.* The first theme deals with my transformation from the traditional use of ICTs (unaware of potential benefits in education) to using ICTs for constructing meaningful learning experiences by discussing its pitfalls from critical vantage points. The theme is about depicting how culturally contextualized teaching and learning is likely to help empower culturally sensitive curriculum and pedagogy in education. Moving towards Arts-based Living Pedagogy comprises my dealing with the benefits of arts in holistic knowledge construction which is significant for creative as well as critical thinking. Theme: Shift towards Progressive Pedagogies presents my involvement in several pedagogical practices governed by constructivist and transformative learning theories indicating my shift from traditional teaching and learning practices. At last, My Possible Shift in Embracing Transformative Curricula is the theme developed to discuss my transformative shift in thoughts and actions from the conventionally conceived nature of curriculum to transformative visions of the curriculum.

ICTs: The Tools for Innovation and Empowerment

In chapter IV, I unpacked my experiences of using/exploring various technological devices in my non-academic journey. Based on those lived experiences, I tried to put myself up to date with emerging modern technologies though I was not economically sound to purchase them which is one of the challenges for people to get access to modern technologies in low economic and developing countries like Nepal. I uncovered the reality that my academic journey was perhaps ignoring the usage of any form of technology by confining my learning in narrowly conceived teacher-led instructional practices. Surprisingly, I somewhat tried to use them mostly to ease my activities. However, I seemed to be confined to limited

usage. My MEd and MPhil at KU and my involvement in various technology-related workshops and conferences would be the time when I became aware of the potential benefits of ICTs integrated learning in the era of the rapid development of science and technologies on the one hand. On the other hand, it appears that I became aware that there are widespread debates about the unfair usage and emerging crimes due to digital technologies in education which might be the cause of creating a divide among people as well as raising critical questions towards humanity.

As much as I remember the day, it could be August 2016. This was my first time at KU when I was among those IP boards, projector, computers, and inside a room specially designed for conducting classroom discussions and collaborative group work which were likely to give the scenario of some progressive classroom settings, completely different from previous traditional classrooms wherein I completed my school and under graduation. On the first day, it was my first ever experience of interacting with an online learning platform or Learning Management System (LMS): MOODLE. When I first heard this word, resembled NOODLE that people usually eat on breakfasts. Later, I came to know that the learning platform has a plethora of things to support virtual and online teaching and learning. This is an online teaching and learning platform developed by Martin Dougiamas which was released to the public in August of 2002 (Dougiamas, 2004). My resemblance of MOODLE with NOODLE was correct when I explored and applied its multiple features specially designed for educational purposes which provides a broad range of learning opportunities. From a student's perspective, I found that it has a massive online platform to communicate with facilitators and co-learners guided by the social constructivist theory of learning (Helling & Petter, 2012). This, I found, appears to be an alternative form of face to face learning mode in providing both facilitators and students to share thoughts, ideas, learnings, etc.; tracking the records of students; tracing the learning achievement and level of students; figuring out

the engagement of students and teachers on the learning tasks; facilitating self-learning; and running collaborative works by inviting students to put their views on the given context/topic/issue, etc.; making available the digital library to access the required resources to be downloaded; accessing the learning achievement of students, etc. This way, Moodle was/is used in 'n' number of situations to enhance the learning of students which appears to be governed by constructivism learning theory. This is why my metaphor 'Moodle as a noodle' sounds relevant.

At this point of inquiry, I found that it has become necessary that the integration of asynchronous mode of learning using ICT platforms could be an alternative for providing access of education to all the pupils. People have even started to realize the usage of such platforms during the Covid-19 pandemic. This might also be true with the evolution of the distance mode of learning. However, arriving at this stage of inquiry, I raise some questions here. *How can our practice make inclusive participation of learners in such ICT platforms? What if students have difficulties in handling digital devices or have poor/no ICT literacy? More importantly, what if students cannot afford those devices? Then, what could be the role of the system for inclusive accessibility? Are we sure about students' learning?*

Besides several asynchronous modes of learning, I had to interact with hundreds of modern ICT tools and techniques though there was a limitation of my time and effort to master all the skills. With this involvement, however, I started to conceive ICTs as one of the developments by humans and has become an essential part of our life. During this time, the courses could help me develop multidisciplinary and interdisciplinary skills to use them in multiple tasks as a learner and teacher. Some of the examples are related to mathematical manipulation, simulations, and visual image or model construction in dynamic online and offline platforms; the use of art in developing resources; the skills of exploring the how parts of integrating these tools and techniques to learn new things, to explore diverse information

on the internet, to share my ideas, expertise, and experiences with several online communities. Moreover, the access to using online platforms could be helpful for me to accelerate knowledge and skills in several fields by taking courses provided by several universities and organizations around the globe. Due to this, I can say that modern technologies helped me enhance my personal and professional life.

My learning took place in the new dimension of innovation where learning by doing with continuous reflection appears to have no boundaries. This seems to be so powerful in terms of the construction of authentic learning experiences by visualization, reflection, and connection. The tools are essential for representational knowledge leading to developing conceptual knowledge through ICTs (Finkelstein, 2005). Similarly, these could help the pupil to reflect, review, assess, and construct knowledge actively engaging in the learning processes.

My engagement with GeoGebra, Geometer's Sketchpad, Desmos, etc. appears to be dynamic to allow students to experience mathematical construction and their interdependence between mathematics and visual which are artistically beautiful objects (Milner-Bolotin, 2015). These seem to be well-developed for students, teachers, and educators to use as per their interest. This appears to be powerful in terms of inserting mathematical contents, performing visualizations, designing aesthetically rich models (2D and 3D), adding stunning manipulations, and presenting those materials both online and offline. So, these are likely to open the doors to use mathematical modeling in order to explore the relationship between art (e.g., paintings, patterns, architecture, mosaic, etc.) and mathematics or any other disciplines.

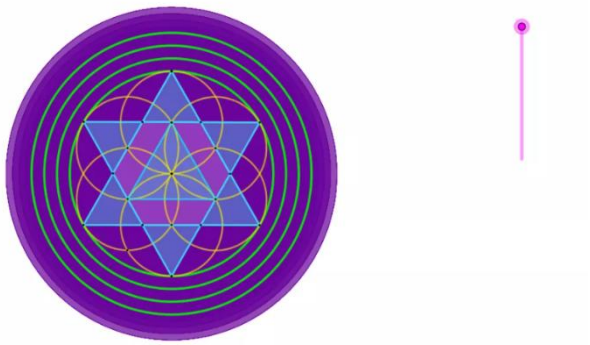

Figure 36. One of the mandala arts developed in GeoGebra

Here, looking into the past few years, the development in information, communication, and technologies might have given unprecedented opportunities for harnessing knowledge and skills such as creative thinking, critical thinking, communication, and collaboration. This possibly has brought us to a new paradigm of knowledge: the paradigm shift of educational practices from traditional (teacher-centered) to the virtual learning environment (learner-centered) with the help of ICTs (Majumdar, 2015). This shift is likely to change the role of a teacher to the facilitator, knowledge creator, and co-learner. The role of learner has also seemed to be transformed from learning to use ICT tools to using these tools to enhance their learning and problem-solving. The rapid use of information communication and technological tools and techniques perhaps have transformed learning to access the world beyond the four-wall of schools. Given this, e-education seems to have the potential to be empowering and world-changing, but critics said that it can lead to dangerous knowledge such as 3D-printed weapons and so on (Fadel et al., 2015). ICT literacy is one of the 21st-century skills that has been emphasized by education in recent days. The evolution of education 4.0 and beyond has, to a great degree, placed educational practices to integrate more empowering ICTs (Keser & Semerci, 2019). In this spectrum, the Internet of Things (IoT) has emerged a new dimension in learning through technological tools. The evolution in ICTs now is likely to be dealing with technological advancements including artificial intelligence (AI) which comprises machine learning and deep learning. Therefore, this development primarily seems to affect the way we learn and teach. However, the educational practices, other than the IT and computer engineering sectors, are not likely to be so developed to embrace these changes. Similarly, the lack of ICT professionals in education, the lack of skilled teachers, and the lack of infrastructures can be the major complexities in education.

Coming to this stage, *did I become a blind supporter of ICTs in education by overlooking its inescapable pitfalls?* The above narrative portrays a similar context, *doesn't it?* On the one side of a coin, the rapid development of information communication and technologies and its implementation in education can be seen as a positive aspect for assisting educational practices thereby shifting the traditional modes of delivery to modern technology-integrated education. This could be worthwhile for those who have access to the development. However, on the other side of the same coin, *what about the people who have inaccessibility to digital devices or any ICT facilities?* This sounds practical in terms of countries like Nepal where very few parts are urban and semi-urban, but most are rural areas. These remote and rural areas seem to be far from internet access though the people use mobile phones, radios, TVs, and few computers. In this context, *how can the education system assure inclusiveness in the usage of ICTs? In what ways does the education system provide equal opportunities for the pupils in ICT integrated education?* At the same time, I have experienced a social divide between people. The social disparity is that elite people can have access to whatever they like whereas this seems to be far from reality for poor people. This might be helpful to promote the power imbalance in society started from the miniature community (classroom). That means the ICT integration in education is likely to maintain the power hierarchy of people based on socio-economic, political, and intellectual background. Similarly, the monopoly of ICT appears to be complexities for the multilingual, multicultural, mixed-ability, and culturally diverse classroom settings like in Nepal.

Yes, it is acceptable that the integration of information and communication technologies could be a means to support students learning thereby enhancing their skills to develop outstanding resources to solve real-world problems. However, there seems to be a business of some people or organizations in the name of providing quality education through technology-integrated learning. In the context of Nepal, there seems to be a huge difference

between private and public institutions because of technology. I have experienced that the private sectors, might be governed by capitalism, are spending huge amount of money in ICT integration and advertising with the slogan 'high-tech facilities' and a 'well-equipped computer lab' without mentioning how they use such technologies for quality learning (Shield, 2011). Moreover, this might be one of many reasons to create an environment of competition among private sectors. At the same time, people are likely to be 'clients' to support these sectors without critically analyzing the quality of education they are providing to their children. Thus, people might be also responsible for this disparity.

Giving closer look at ICT integrated learning, I have experienced the misuse of technological tools. The development of ICTs could be to facilitate the learning and ease our daily living, but *do we have permission or is it legitimate or is it legal to copy-paste the information or other's ideas? Can we rely on a single source for getting information?* Googling seems to become a widespread business in today's education system wherein people are likely to rely on Google's information, copying, and pasting tasks. *Where is ICT literacy?* When I was doing my MPhil in STEAM education, I got an opportunity to supervise one research project of a student of MEd. This student had a special interest in copying and pasting the information from other's work—a lazy bone. She undertook this research project on the role of ICT in mathematics learning of students of secondary level. I instructed her to write her understanding first. When she came up with her first draft, I was surprised going through the texts, ideas, interpretations, and review of the literature. I became skeptical because she was an average student and asked her, *"Did you develop this on your own?"* She hesitantly replied, "*Yes, sir. However, I went through Google and write accordingly."* I still had a doubt and decided to crosscheck her work. When I did this, I remained perplexed by seeing almost 90% match of her text with Google's information and other's texts in their publications. Later, I warned her not to copy as it is from other sources and follow some legal

academic procedures if she wants to do so. Arriving at this point of inquiry, I am being thoughtful, *was she aware that copying and pasting other's work without their permission is an academic crime? How much knowledge, skills of ICT literacy, digital wellbeing do our students have? How can this be reduced in academic contexts? Who is responsible, tools, person, or the system?* This seems to be similar to the copying-pasting job students and teachers do in a traditional delivery system of education, but the mode is different. In conventional mode, teachers copy information from textbook or notebooks and paste on the boards, students copy from the boards or textbooks and paste on the answer sheets. In the modern age, the business is seen to be similar, but we use modern technologies. *Can we accept this as development?*

ICT literacy has become one of the 21st-century skills that people need to thrive in this complex world. In this phenomenon, advocating the potential benefits of ICT integration in this 21st-century education and being aware of and taking actions against the growing problems (inaccessibility of internet and devices, lack of motivation, lack of collaboration, insufficient knowledge and skills, lack of technical support, language barriers, etc.), it is possible to envision a sustainable environment supported by technology so as to foster human development through ICT integrated education thereby promoting innovation and empowerment.

My Possible Shift from Personal Development to Community Service

The foregoing narrative discussion might depict how I developed knowledge, skills, and competencies in the field of innovation and technology including its ethical usage. As a part of this system of education, I felt that I need to contribute what I learned to the education system so that I could make at least a tiny change from my side. These transferable skills might be essential to make a shift from our conventional ways of educating people. Similarly,

with a shared-value perspective, I believe in the participatory approach of co/learning because of the proportional and interdependent nature of relationships among people.

The shift is likely to be noteworthy when I started going beyond my limited area of classroom teaching as a facilitator to support people from diverse educational practices (parents, stakeholders, educators, etc.) to spread the awareness of ICTs integrated education. This transformation took place right after my completion of MEd. I consider now that my rich engagement and research of exploring ICTs and digital technologies helped me to share ideas and thoughts and assist other professionals in developing their practices. I involved in several professional development workshops and webinars to support others. Meanwhile, I developed my website (www.netraz.weebly.com) to communicate my thoughts and ideas and make my services public with the purpose that people get benefits from my work. This helped me to work as a freelancer to help people in their personal and professional development. The major motto is likely to transform our traditional model of education. With this, I started my YouTube channel. This helped me to build my community of people to share thoughts and develop skills. Eventually, this seems to be helping me to reach out to a wider community of people who can take advantage of my endeavors. At the same time, I was/am taking their feedback and comments as a source of extrinsic and intrinsic motivation to improve my works and move towards greater achievement.

As I realize now, I was/am serving people to support them in solving their existing problems, especially in ICTs integration, and for continuous professional development. By doing so, it appears that I developed a sense of care, I was/am proud, and financially and educationally I am growing. *Are these some transformative sensibilities? Do educators have such ability to transform our system of education?* For me, yes.

The above scenario is articulating how/why traditional ways of providing education have to be shifted to embrace more progressive educational approaches including digital

technologies. The education appears to be an alternative for what I experienced from school to undergraduate level as discussed in chapter III. Blending ICTs in pedagogical practices akin to shift the overly emphasized teacher-centered and disempowering education cultures (one-size-fits-all in a multi-ability classroom). Instead of prioritizing parroting mode of education with the major emphasis on rote memorization without using teaching materials and models, ICTs platforms can be integrated to design and develop numerous resources and apply them in the teaching and learning process. However, without residing classroom teaching in a narrowly bounded ICT-based environment, learning processes can be fostered with multiple options of using such platforms to be more interactive, students might have apt space for reflective thinking, students are likely to use such platforms ethically by developing creativity and critical awareness, students appear to have opportunities to build such ICTs on their own. So, this might be essential for developing students' abilities to become designers and developers by keeping humanity at the center. While blending teaching with ICT, I consider the three guiding principles that it is (i) developmentally appropriate and complement learners' learning experiences, (ii) facilitated and guided by facilitators, and (iii) carefully considered for the well-being of learners. This way, it is possible that we can transform our educational practices to integrate skills, values, attitudes, and knowledge required for the 21st-century learners.

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I Discovered Mathematics in my Culture: Shifting Towards Contextualization

Nepal is a multi-lingual, multi-cultural, and multi-religious country with 126 caste and ethnic groups speaking more than 123 languages and celebrating more than 10 religions (Central Bureau of Statistics [CBS], 2012). Given this context of our country, students come to school with diverse cultural backgrounds and experiences of their own community of practices. Culturally the classroom is heterogeneous. In such a context, *can any educator*

(teacher, curriculum developer, or education expert) think that one-size-fits-all approach of education addresses all the students inclusively? Yet *can conventional teacher-led pedagogical practices fulfill the needs of every child? Is not this our failure to consider students as objects or all of them have equal pace, same context, and similar abilities of learning? Why are students not motivating, not interested, and not engaging in learning mathematics and science or generally in any learning activities? Is this because of west-colonialized practices?* I can raise such questions to myself and our practices of education at this moment of this inquiry.

Involving in the process of critical reflection and critical self-reflection, I started being critically reflective upon my practices and actions of being a learner, teacher, and teacher educator. I started to access and examine my and others' beliefs, values, and actions on curriculum and curricular practices. In many ways, I found myself being responsible for promoting imposed and disempowering educational practices, perhaps, under the domination of some taken-for-granted assumptions which was/is likely to serve very few people (elite). Of several unexamined and unquestioned in/visible practices, I realize now that that education system and I (being the parts of the same web of life—one's way of 'being' impacts other (Luitel, 2009)) were in the favor of promoting culturally decontextualized nature of education by employing narrowly conceived and deeply rooted conventional ways of education.

Before my entry at Kathmandu University, I was probably unaware of my cultural practices in terms of their relevance in education. Till undergraduate level, the practices I depicted in Chapter III might portray that I would not be presented with the learning contexts that encourage me to value my cultures and see interconnectedness among me, my culture, and formal education. Even in mathematics and science subjects, it seems to be impossible to find our cultures in textbooks, curricula, and teaching and learning resources (Luitel, 2009;

Shrestha, 2011, 2018; Pant, 2015). I was associated with Newari culture as an ethnic group. Also, with my rich engagement in several brick factories, I had experienced another culture. These cultures were/are embedded within me because I grew up experiencing them. Hence, *who is responsible for separating my living contexts or cultures and formal education? How can we bridge the lifeworlds and the academic experiences of students?*

It could be the beginning days of December 2016. There was a course in the first semester of MEd named Teaching and Learning in Mathematics Education. The course used to cover a plethora of ideas, thoughts, and practices aligned with conventional to progressive to transformative teaching and learning practices in mathematics. As in usual days, the facilitator Mr. Reformist came with his laptop, some chart papers, and some markers. It appeared that based on the collaborative classroom practices, Mr. Reformist divided nine students into different groups and started to instruct us for doing an activity. The classroom discussion might have progressed accordingly.

Mr. Reformist: *Dear Friends, we are going to do something different today from the other days. I have divided you into different groups. Can you guess how I would divide the groups? Does your group have at least one common characteristic?*

We wondered! I was both excited and nervous at the same time. In my group, I had another friend Raj. He nodded at me and whispered, *"I think, our facilitator divided us based on our cast. You and I, both are Jyapu*[7]*."* I replied following his pitch, *"What is the purpose then? I think you are incorrect or might be possible, I don't know."*

Sanjaya from another group guessed.

Sanjaya: *Is this by our current involvement in schools or colleges, Sir?*

Mr. Reformist: *No! That is not on the agenda. Other guesses?*

[7] Came from the word Jya ya Fu (Nepal Bhasa or Newari language) meaning a competent worker. This is a famous word for denoting a male person from Newari indigenous community.

Certainly, my peer Raj stood up excitedly and started speaking.

Raj: *Netra and I are from the same cast Newar. We shared almost the same background of Newari culture. In that group* (pointing to the members of another group)*, they both are Brahmans, and so forth. I think you divided the group based on our cast or ethnic background, didn't you, Sir?*

Mr. Reformist: *Exactly. Put your hands together for Mr. Raj.* (We applauded him)

Mr. Reformist started sharing one of his presentation slides with the help of a projector. On the whiteboard, it was written *'Ethnomathematics'*. I put my big eyes on the word and took some moments to spell it out properly. I might have been thinking, *"What? Ethno …. mathematics? What kind of mathematics I am going to study again? I studied calculus, geometry, real analysis, algebra, and several course books of mathematics. Is this a new version of mathematics that I am going to study?"* In no time, Mr. Reformist finished giving us one sheet of chart paper and markers to each group. He then started to instruct us. His instruction could be portrayed as follows:

Mr. Reformist: *Well. We are going to learn something new today. You might have experienced how much our culture is rich mathematically. We can find several mathematical contexts and concepts in our cultures. There might be sufficient artifacts in your culture that embody some mathematical values and characteristics. Today, I want you to discuss in your group about the mathematics embedded in your culture. You can also write the artifacts and their connection with mathematical content knowledge. Well, you have 15 minutes to finish this task. In the very next minute, you will collaboratively share what you have come up with. I will help you in your discussion. Please go on.*

[I was even shocked by the facilitator's words about cultural mathematics. Several questions captured my mind. The very first time, I was hearing the word 'cultural mathematics'. *Is there any culture that has calculus, algebra, statistics, etc.? Why do we need this cultural*

mathematics to learn our formal mathematics? Is this a new perspective in mathematics? Oh, my goodness! My head was spinning around. Finally, I decided to ask more about this matter with the facilitator.]

Me: (with a bizarre and perplexed face and feeling) *Sir, I could not catch the concept and task as well. What is cultural mathematics? Who discovered this type of mathematics? How can my culture have mathematics? Could you please clarify?*

Some of my friends were listening to me cautiously as if they were also confounded about the task. They seemed to expect some more clarification on this because it could be new for them as well.

Mr. Reformist: *Netraji, thank you for the questions. You raised relevant issues. Cultural mathematics means mathematics that you with your culture have been using for many years or even from your ancestors. These are 'our' mathematics existing in culture. For instance, there are communities in the village area where people use 'plough' or halo to plough the land. You might have seen a plough, am I right?*

Me: *Yes, Sir. We use this material to plough the land for the preparation of sowing the seeds. How can that be linked with mathematics?*

Mr. Reformist: *Good. That is a matter of cultural mathematics. The plough can be used to learn several concepts of mathematics such as there are straight lines, curved lines, different angles of different sizes, etc. So, these culturally embedded materials can be used to learn and teach mathematics. One of the research studies done by Kathmandu University School of Education [KUSOED] in collaboration with UNESCO (2008) in Gopali and Tamang community in a remote village had come with findings that the cultural artifacts, these cultural groups are using, are immensely helpful to enable lower secondary school teachers to develop culturally*

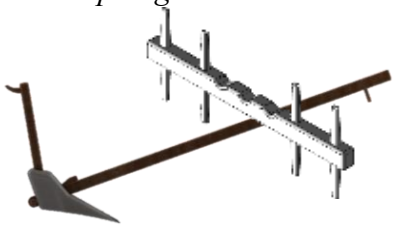


Figure 37. Traditional Nepali plough

contextualized resource materials to supplement the learning requirement for the meaningful understanding of content knowledge. For instance, Nanglo can be utilized to construct the meaning of circles and related concepts. Also, the integration of cultural aspects in learning might help us to preserve our cultural heritage and identities.

Me: *Oh! I got it, sir. It means every culture has its unique practices and artifacts. These can be integrated into learning mathematics, right sir?*

Mr. Reformist: (Being nice) *Yes, you are correct. Now, your Newari culture is also filled with several artifacts that can be used in classroom teaching. Discuss with your peer and come up with your final product to present.*

Me: *Thank you, sir. I understood the concept. We will do that.*

In about 15 minutes, we had a peer discussion to explore our cultural artifacts and practices that best represent mathematical concepts. We tried to link those artifacts. In doing so, we explored several artifacts and practices. Finally, we prepared our presentation on a chart paper by mentioning the cultural artifacts and their utilization in learning mathematics. This would look like the following:

Table 2

Some Newari Cultural Artifacts and Their Mathematical Usage

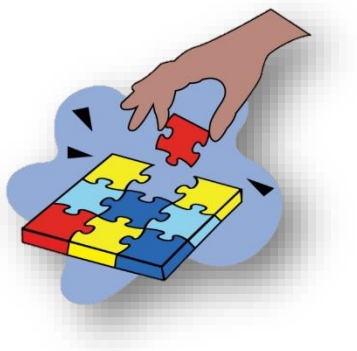
Name of Artifact	Picture(s) of the Artifact	Cultural Usage	Mathematical Usage
Nyapu Shikha (Five Gold Chain)		It is another intricate piece worn on the head by Newari women and has many small strings attached to a point and is worn on the side of the head.	• Several geometrical concepts such as quadrilaterals, stars, lines, angles, points, etc. • Symmetricity • Patterns

Dhimey Baja		This is a traditional Newari musical instrument used in various cultural programs and rituals.	• Concepts of circle • Concepts of cylinder • Concepts of geometry (shapes, lines (intersecting lines, parallel lines), angles (alternate angles, co-interior angles, vertically opposite angles), etc.) • Mensuration • Patterns

Other groups had done the similar. One after another, we shared our findings. In this way, with awareness, I jumped into the world of ethnomathematics. Mr. Reformist had shared some of the key works on ethnomathematics and on how our cultures can be assets for us to learn mathematics contextually. Eventually, the class was over for the day.

This could be an authentic experience for me to discover profound mathematics in my culture. I found myself proud because I was/am the representative of especially two big cultures such as the culture of brick factories and the culture of my ethnic group: Newar. During the exploration of mathematics in my cultures, I found that my cultures are mathematically rich (See chapter IV for brick factories). The experiences perhaps enthralled me and encouraged me to respect my cultures with cultural sensibilities and their significance in mathematics education. Thus, this is the discourse regarding ethnomathematics originated by D'Ambrosio (1985) who created a dynamic space for culturally contextualized mathematics (Pant, 2015). From the educational point of view, Rosa (2000) considers ethnomathematics as the intersection among cultural anthropology, mathematics, mathematical modeling that might be used to assist students to interpret various mathematical ideas and practices found in their community of practices. Within this discourse, I became aware of my responsibility as a learner, teacher, research practitioner, and teacher educator to explore and promote my community of practices that embed mathematical meanings through my personal and professional practices. In so doing, this research inquiry is one of those endeavors to represent my cultures.

By this, I need to envision or call for an education system that has the capabilities of acknowledging students' indigenous and existing cultural practices to link their lifeworlds and mathematics and any other disciplines. I recounted my role as a teacher and teacher educator to work, study, and research in collaboration with others with the purpose that integration of lifeworlds of students might be essential to foster meaningful learning experiences thereby preserving the existing cultural heritages.



For this, I find culturally responsive mathematics teaching (CRMT) wherein pedagogy is integrating both pedagogical contents knowledge and culturally responsive pedagogy (Aguirre & del Rosario Zavala, 2013) might be imperative. This perhaps refers to, in my opinion, recognizing and integrating students' culture and communities' cultural knowledge while designing instructional planning and executing them in the form of learning activities. The plans can be developed by teacher or teacher-students collaboratively by researching the significance of cultural heritage in learning mathematics and integrate them into learning activities. By valuing the diverse cultural backgrounds of students, culturally responsive mathematics teaching is interested in intersecting both culturally responsive pedagogy and mathematical content knowledge. While teaching, Sullivan (2009) suggests that students' previous knowledge and background should be acknowledged by teachers to not only from a 'mathematical viewpoint' but also consider their complete socio-cultural background.

Discussing in the line of Kilpatrick et al. (2001), every child can best learn when instructional practices have given attention to students' prior learning or what they already know, and what students bring to the classroom. This primarily seems to emphasize the central focus giving to students' culture. In this, pedagogy is likely to acknowledge and

celebrate the fundamental cultures that students are experiencing in their community of practices by giving inclusive accessibility to all the cultures. The pedagogy distinguishes the imperativeness of inclusion of cultural references of students in all aspects of learning (Ladson-Billings, 1995). To define it, Hammond (2014) has to say:

> An educator's ability to recognize students' cultural displays of learning and meaning-making and respond positively and constructively with teaching moves that use cultural knowledge as a scaffold to their learning …. Ultimately, the educator understands the importance of being in a relationship and having a social-emotional connection to the student in order to create a safe space for learning. (p. 30)

As I reflect on from a critical point of view, teaching and learning is a critical response to the colonization of western worldviews of epistemology on education (Pirbhai-Illich et al., 2017) and traditional ways of knowing to promote indigenous and intercultural practices in education. So, in the context of Nepal, culturally responsive pedagogy appears to be helpful to promote contextualized nature of education by acknowledging the immense value of indigenous knowledge in educating people to establish their own ways of knowing and understanding (Rai, 2018). In this view, a learner can be viewed as a whole person connecting to his/her experiences in the world of culture. From the curriculum perspective, there seems to be growing debate in Nepal to make curriculum culturally sensitive to blend culture and education (Luitel, 2009; Shrestha, 2011). Thus, culturally responsive teaching recognizes and infuses the culture of students into the school curriculum for making connections with community cultures (Vavrus, 2008). This seems to be the potential to validate and affirm cultural references of students to help them attain their academic goals. In the context of the one-size-fits-all model of education, cultural contextualization might be essential so that disparity between the cultural lives of students and their experiences in educational practices can be minimized or exterminated.

Employing more practical sense, the role of the teacher as a facilitator could be challenging to scaffold students learning by researching every student's culture, designing tasks and activities that represent student's culture, and executing those activities in all aspects of learning to help them in their academic progress. A huge challenge might occur when a classroom is filled with students from several cultural groups or household practices. In mathematics education, this is a concern for recognizing local knowledge for cultivating mathematical understanding without neglecting the universal worldview of knowledge production. More so, this is a vision for making an inclusive and transformative curriculum (Pant, 2015) with the notion of contextualization of mathematics curriculum to ensure the inclusion of local knowledge tradition (Luitel & Taylor, 2005).

Moreover, the ideas of Cultural Fund of Knowledge (CFoK) in teaching and learning appear to have the potentiality to bridge my (or students') lifeworld with formal academic practices. Moll et al. (1992) refer to the fund of knowledge as the essential bodies of knowledge and information that households use to survive, to get ahead, or to thrive. Supporting this view, I consider this as knowledge/skills that are imperative for the household or every individual while functioning their lifeworlds and they use for their well-being. Putting the concept in a more practical form, funds of knowledge can be described as accumulated life experiences, knowledge/skills that people use to survive daily, academic and personal knowledge, etc. (Hogg, 2011).

Bringing the household knowledge inside the classroom discussion and integrating them into the pedagogical practices seem imperative in order for teachers to understand their students and students to feel school as home thereby getting ownership over the knowledge that engenders the academic successes by involving in observation and investigation. Moll et al. (1992) discussed various funds of knowledge such as in agriculture (ranching and farming, animal management, soil and irrigation, crop planting, etc.), household management

(budgets, childcare, cooking, etc.), etc. For example, if students' fund of knowledge is grounded in pottery making, educational processes might integrate mathematical ideas such as shapes, sizes, area, volume, and comparison, ideas of arts and design, etc. Therefore, the fund of knowledge is 'a concept embedded in an individual's cultural identity, and the various aspects of cultural identity such as ethnicity, language, and customs – are all linked to student engagement' (Maitra, 2017, p. 94).

Here, to implement this in curricular practices, Gonzalez (2005) argues that curriculum must be 'culture-sensitive' or teachers have to be aware of cultural issues by using culturally sensitive pedagogy. The role of a teacher is greatly emphasized for being a researcher or teacher-researcher using ethnographic methods (Gonzalez et al., 2005; Moll et al., 1992) to study and observe the culture of students. Also, teachers can have students write their lived experiences in the form of essays (in the form of the autoethnographic genre) related to the fund of knowledge and can conduct home or community visit programs to interact with students and their families or organize meetings for parents to discuss their practices. It could be helpful for reducing the gap between school or education and community or parents. Consequently, the emphasis is parallel to increasing the educational progress of students.

At this stage of this inquiry, I experience that our educational practices were/are likely to devalue the cultural diversity and lifeworlds of students. When I was a teacher of mathematics, I too did not emphasize on the integration of students' cultural and socio-economic contexts. Guided by examination driven race, I considered my role as a knowledge transmitter to prepare students for the final battle by promoting culture-free curriculum and pedagogical practices. I might be good at controlling the environment by ignoring my access to students' cultural experiences. My academic engagement in MEd and MPhil in Kathmandu university as a student and at the same time my critical self-reflection and my discussion with

other individuals and ethnic groups are the incidents to transform my deeply rooted belief

system. Amidst the loss of hope because of the ineffective and culturally decontextualized context of education, I found the ideas of ethnomathematics, fund of knowledge, and culturally responsive teaching or mathematics teaching are likely to transform our traditional practices of teaching for the meaningful learning of mathematics and other disciplines as well as creating authentic learning experiences that guides effective future learning of students. In the multicultural setting like in Nepal, this might be an ideal framework of education that needs holistic educational approaches to humanize mathematics (other disciplines) lessons, include all the students to enhance their learning by respecting each other's diverse contexts and existence to form a common global culture, make learning interdisciplinary, promote critical thinking by consistent link with constructivism (Uy, 2013). This way, I hope that we can practice for sustainability (in the midst of the arising issues of cultural extinctions) by respecting others' differences, embracing solidarity, and valuing cooperation in the field of education which I consider some transformative sensibilities although this is not ultimate.

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Moving towards Arts-based Living Pedagogy

I could be either one of the artists or I could use my arts related abilities as my strengths in learning mathematics and other subjects meaningfully. My deep interest in arts such as writing poems and songs, performing dance and dramas, creating arts-based designs, etc. seemed to be killed by my formal education from school to under graduation by overemphasizing on dull and repetitive routine tasks that make little or no claim on my attention or demands on my artistic intelligence by encouraging me to limit myself in getting good marks/grades on tests or to impress someone as discussed by Holt (1964, as cited in

Rudge, 2008). However, I continued developing my skills in dance and design. This context was likely to be separated from my academic journey and till my bachelor's degree, it was difficult for me to see the relationship between them. I had developed a perception that arts and mathematics as well as other subjects are separate. Even though I was involving in arts-related activities in my non-academic world (see chapter IV), I established a thought that arts are for getting enjoyment or refreshment, spending leisure time, and showing the talents to the world. This could be my deep-seated belief which was inculcated in me by my formal academic experiences. It was my frame of reference as discussed by Mezirow (1991).

My arrival at Kathmandu University had led me to create a new meaning perspective to shift my belief system: arts and other disciplines that are segregated, or they are disciplines that come from different worlds. Succinctly talking about this transformation, I was overwhelmed by observing painting, sculpturing, media arts, etc. here and there in KU's premise. I was perplexed and oftentimes amazed by seeing them in the school of education. I certainly started revisiting my experiences and interest in arts. Naturally, I was playing, in my mind and heart, with dance, painting, sculptures, designs, etc. At the very beginning of my university education, it appears that my taken-for-granted-assumption about arts had not been changed. As I remember now, I saw them as different disciplines. However, my journey in MPhil in STEAM education appeared to be successful in transforming my perspective towards viewing arts and their integration as/for making learning creative, fun, imaginative, and exciting.

Figure 38. Art and sculpture around KU's premise

Is there anyone who does not like music, dance, movie, painting, drama, songs, stories, poems, etc., or who likes any one of these? I think people love arts, so do I. From

birth, human beings respond to arts. When I was a kid, I immediately used to respond to arts-related activities such as clapping hands, tapping the feet on the floor, moving heads, or other body parts when listening to songs. You might have experienced imitating actors or actresses or artists of movies or videos in your childhood, I used to do it oftentimes. You must have experienced your parents encouraging you to dance or sing a song in family functions or cultural activities. Now, the kids are growing with digital devices filled with arts and games. This perhaps evidently demonstrates that arts are integrated into our ways of living and becoming. It seems to be an inseparable part of our life. On the other hand, *have you ever experienced singing songs, dancing, painting, or any other arts-based activities when studying mathematics and science? How many of you have experienced your mathematics or science teachers doing such things?* I am sure that the number is very less. In such a context, *can we not say that arts are removed by schools or pedagogical activities or curricula? Is our education system responsible for this? Who might be then responsible to destroy learners' creativity and their uniqueness?*

After going through several articles and arts-based or integrated educational practices, I came to a realization that arts-based pedagogy seems to be imperative when we are redesigning our education system characterized by holistic pursuits of education. It is considered that there is a fundamental portion of the human brain such as the prefrontal cortex, limbic area, cerebrum, visual cortex, cerebellum, auditory cortex, that need arts-related activities or arts such as music, dance, drama, visual arts, etc. to proper function or activate (see Sousa, 2016; Sousa & Pilecki, 2018; Posner et al., 2008; Boccia et al., 2016). It appears to activate our sensory system which becomes a means through which human beings follow own growth and development. I agree with Eisner (2002) who contends that the sensory system does not work alone; it needs the tools such as language, the arts, science, values, and the like for its proper development. He is emphasizing the role of arts by saying,

'education, in turn, is the process of learning to create ourselves, and it is what the arts, both as a process and as the fruits of that process, promote' (p. 3). To transform the human consciousness, arts could play a crucial role which is not only the way of creating performances and products; it is the way of creating our lives by expanding our consciousness, shaping our dispositions, satisfying our quest for meaning, establishing contact with others, and sharing a culture (Eisner, 2002). In the line of Eisner, Sousa and Pilecki (2018) illustrate the benefits of arts integration such as arts engage the young brain, develop cognitive growth, advance social growth, introduce novelty, improve long-term memory, reduce stress, and make teaching more interesting. This is possible because I assume arts are central to creativity, problem-solving, critical thinking, communication, self-direction, initiative, and collaboration. Arts are likely to promote creativity (innovation, ingenuity, imagination), aesthetics (beauty, sentiment, complement), ethics (virtues, human rights, justice), and rhetoric (expression, representation, persuasion).

The discussion of developing learner's creativity seems to be central to emerging educational changes in the context of Nepal. The emergent inclusion of STEM (Science, Technology, Engineering, Mathematics) in the curriculum and practice of STEAM education in some schools are likely to be exemplary. There appears a perspective that the right hemisphere of the brain might be effective for spatial abilities, visual imagery, creativity, relational and generative thinking, subjective, possibility. In this context, developing plenty of resources to facilitate arts-based learning and their proper execution appears to be helpful to maximize the function of both sides of the brain.

As per my experience, I could shift my perceptions from the arts as a separate entity to as integrated parts of human experience. This happened when I started envisioning an education system that seems to have huge potential to accept a learner as a whole person who is responsible and autonomous for his/her actions for creating this world a better place and

arts as a means for discovering the whole. I have discussed the value of arts in holistic education here and there in chapter IV. My quest for arts integration might have taken a pragmatic turn when I implemented the ideas in some of my professional activities conducted as a teacher educator.

It could be any day of April 2020. The whole world was fighting the coronavirus pandemic that started from Wuhan China. At that time, there were few cases in Nepal. It could be early morning. I was sitting on a chair taking a sunbath, sipping a cup of coffee, and thinking about the future of the whole world and humanity during the pandemic because countries were shutting down. As soon as I took two or three sips of the coffee, a phone call broke my reverie. It was the call of one of the representatives, Mr. Sherpa, from the ECD (Early Childhood Development) center located in Kathmandu. We had a professional relationship. He used to call me for conducting workshops and talks for ECD and schoolteachers. I picked up the phone and started the conversation. Meanwhile, he put his purpose of calling me, *"Netraji, I am organizing one of your sessions on arts and creativity. I think you are the right person to conduct the session as I found you are doing MPhil in STEAM education and your involvement in several such workshops. Could you please manage time for three hours for tomorrow?"* I responded to him with a mild smile, *"Hahaha! Thank you for the compliment and for providing this opportunity, sir. These days, I am working on similar projects. Well, the time is suitable for me. I will come."* I had one whole day to think about some activities and prepare slides for the presentation besides my other works.

The next day at around 3 PM, I was in front of around 20 schoolteachers, most of them were females. Mr. Sherpa had introduced me and briefly explained the agenda of the session. The floor was open to me. Possibly I started my conversation by explaining my work and my interest in arts-integrated pedagogy and STEAM education. By then, I encouraged

them to share their experiences with arts and what they like the most about arts. There were perhaps common interests of people in the arts. I found that everybody loves music, performative arts, sculptures, etc. After a few minutes of such discussion, I emphasized the agenda for the session. The session was designed to develop an understanding of the value of arts-based pedagogy.

I started sharing my PowerPoint presentation wherein I shared my engagement with sculpturing and media arts, my passion for dance, and my experiences of exploration of arts and education at KU. Most importantly, I shared my ideas regarding the educational significance of those arts and how to integrate them (see Chapter IV). Interestingly, they seemed to be engaging in the talk. As soon as I finished my talk, I requested them for their observation regarding the ideas I presented. As much as I remember now, one of the female participants (who was also the principal of a primary school) put her observation.

Sir, this is amazing and genuinely a new experience for me. Arts have been my favorite since childhood. Reciting poems, singing songs, watching movies, etc. were/are my hobbies. As I grew older, I did not find those mostly in mathematics and science learning contexts. My school had music class, but it was only for those who can afford it, which means programs were designed for elite people or students who have deep interests (to be artists) can only join such programs. Sometimes, the school used to organize cultural programs and extracurricular activities (ECA). These were also for selected students. Is this a kind of disparity? A hegemony in giving education? Is it not a biased system of education, sir? At present, I am running a school governed by the Montessori system of education. For earlier grade students, we offer them some arts-related activities such as playing games, involving in dance, painting, and music. However, as soon as the number of grades increases, books of eight and nine subjects seem to be able to replace these activities. I did not know the value of

arts in learning mathematics and other subjects as well before your presentation. This is an insightful talk for me.

As soon as she finished, another participant raised his hand and started to speak, might be in the following way.

I came from a remote area of Dolakha district. In my school, there was a teacher who used to make poems and songs of mathematics formulae. For example, there was a famous one-line mantra to remember the formula of basic trigonometric ratios: pandit badri prasad hari hari bol (पण्डित बद्रि प्रसाद हरी हरी बोल) representing $sin\theta = \frac{pandit\ (p)}{hari(h)}, cos\theta = \frac{badri\ (b)}{hari(h)}, tan\theta = \frac{prasad\ (p)}{bol(b)}$. *At that time, we used to sing, enjoy, and remember. This was such a fascinating and enjoyable moment for me to memorize things with the help of songs and poems. In the higher secondary and university education, those things unfortunately vanished because I did not experience them. As a teacher, I also followed rote memorization and routine problem-solving methods while teaching. After listening to you and observing your work on arts-integrated fields, I am pondering on some questions: why does education separate arts, sir? Why do curricula of mathematics and science devalue various forms of arts as you discussed recently? Are teachers responsible? Now, by listening to your talk, I found the teacher, in my school, knew the value of arts to learning. Now, I became aware of how and why to integrate arts into learning activities.*

I became at least happy because participants would get the ideas I intended to convey. I thanked them for their observation. However, I could relate their emerging questions to what I usually used to ponder regarding arts and the separation. As much as I could, I replied to them by saying, *"I agree with your concerns and I feel the same. It seems that we have similar experiences that arts might have been separated from formal educational practices for the sake of cognitive development ('the brain is everything in learning' notion). There are loopholes in the system of education including curriculum and pedagogical practices. There are the lights of hope as well such as STEAM education that might make aware of this integration. So, without playing the victim-blaming game, we need to do something from our place. By understanding its value in learning, we have to start from our place individually or collaboratively to acknowledge them and integrate as much as possible. This is how we can bring changes."* I could see them giving their agreement with what I expressed. For the next activity, I divided them into five groups and explained the purpose of the next task. The task was to discuss one of the forms of arts, the educational implication, and how to use it in the classroom. The groups were assigned 30 minutes for the completion of the project and five minutes for each group to present their final presentation. I encouraged them to use online platforms to explore the respective form of arts. After this, each group presented their thoughts on arts integration. As expected, almost every group came up with one arts-based activity and explained how to perform in the classroom. For instance, teaching basic geometrical shapes and solids by involving students in painting and sculpturing, teaching the

Figure 39. Me in a workshop (engaging participants in arts-integrated activities: algebra tiles)

social inequalities through stories and dramas, conducting a project wherein students can shoot videos using camera and edit with designing software, teaching the idea of force through drawing and theater, developing songs or poems for learning formulae or definitions, to illustrate a few. In this overall workshop, participants came up with an insight that arts can be used as a methodology or pedagogical tools to perform the learning activities (Goldberg, 2017) which makes learning engaging, thrilling, curious, motivating, and eventually meaningful.

Whilst exploring the potential education significance of arts integration, I found that students who had studied a musical instrument before fourth grade had higher mathematics scores than other students who did not (Haley, 2001). Similarly, in another research study Limb and Braun (2008) found that participants in arts can foster spontaneity, self-expression, moderate the limiting effects of inhibition, and lead to creative results (Radel et al., 2015). On top of this, I agree with what Eisner (2002) listed out some competencies of arts that are crucial for students to develop creativity, perception of relationships, communication, divergent thinking skills, making decisions in the absence of rules, perseverance, imagination, aesthetic values, collaborative skills, among others. Leavy (2015) contended that arts-based practices might be vital in terms of cultivating critical consciousness, raising awareness, and empathy which probably helpful to challenge dominant ideologies and stereotypes to advocate for social justice as well as understand every being through heart and mind. In so doing, empathy can be a powerful tool for releasing the imagination for possible social transformation and actions (Greene, 1995) wherein 'aesthetic experience as a means might awaken students' consciousness for advancing democratic values with multiple perspectives, freedom, and responsibility' (Moon et al., 2013, p. 223).

In this way, I found myself evolving and moving towards the transformation of my actions and perceptions from arts as a separate entity to arts as integrated with human

experiences. In this context, STEAM education could be one of those eye-opening and emerging programs in education that prioritize the integration of arts to teach science, technology, engineering, and mathematics in a holistic sense. At this stage of inquiry, I conceive arts to explore and express a single thing in multiple ways by enhancing divergent as well as convergent thinking skills. Since cognitive, affective, psychomotor, spiritual dimensions of learning are complementary (Buchanan & Hyde, 2008), arts can be powerful to blend all four in one place. My involvement in this program perhaps has encouraged me to work further to develop a vision of arts-integrated pedagogy and act towards developing an arts-integrated curriculum which likely to be governed by STEAM education. In a pragmatic sense, there appears a need of an educational approach that engages students and teachers in developing or making activities and encourages them to come up with an idea or product that is applicable to solve real-world problems including the existing social and political issues.

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My Possible Shift towards Progressive Pedagogies

Coming to this stage of inquiry, I reflect upon the lived reminiscences of my academic journey and raise some critical questions to myself. Was it a meaningful journey? Was my academic achievement (awarded as a brilliant and best student) able to solve my existing and emerging daily life problems? Could I accumulate good values, character, attitudes, and essential life skills? Could/can I raise critical questions against unjust social, economic, cultural, political, and educational practices?

As a teacher, *could I be successful to make learners become their own teachers, which perhaps is the major attribute of lifelong learning or self-regulation?* More practically, *how many of my students can solve their daily life problems? How many of my students understand themselves as learners or a human being? How many of my students will become creators? Could I make them succeed in their life's endeavors? Was I able to develop*

knowledge, skills, values, emotions, and attitudes in them to cope up with every problem they face in near future? Oh, my goodness. These are some threatening questions I am raising to myself and our system of education. Eventually, let's think about our (teachers, educators, and researchers) role to transform our ways of producing human resources through education. *Who is responsible? You, me, or the entire education system?*

There seems to be a noteworthy shift of my thoughts and actions towards valuing the lifeworlds of students and me towards exercising them in teaching and learning contexts. I was perhaps guided by pedagogical contexts which remained mostly silent in addressing lifeworlds of students focusing on textbooks and teachers as ultimate sources of knowledge ideology. You can better make sense by going through chapter III. Perhaps, the pedagogical approaches employed could give a better picture of the disengaged nature of teaching and learning guided by Western Modern Worldview (Luitel & Taylor, 2013). Learning might have lacked fun, have lacked hands-on and hearts-on activities, and have limited meaningful tasks. The exclusiveness in my practices might be guided by the 'mind as director of learning' ideology. Most of my learning scenarios as a student wanted me to subscribe to disempowering traditional input and output mechanisms – a pipe pedagogy. Pedagogy as a pipe metaphor may persuade a technical process, perhaps guided by technical human interest, where teachers are at the one end and students are at the other receiving end, not affected by the external environment believing that learning is the task of mind (Luitel, 2009). Arriving at this stage of inquiry and as I reflect on, *how could I bridge my cultures (non-academic lifeworlds mostly discussed in chapter IV) and academic experiences to thrive my learning for becoming a lifelong learner?*

It could be any day of October 2017. This was the regular class of Teacher Professional Development (TPD). Now, I became familiar with the learning environment and modality mostly guided by constructivist and transformative educational thoughts

(emphasizing rich individual and collaborative tasks and critical reflective practice). The facilitator Mr. Amrit would come with innovative activities almost every day in the class. This day, he entered the classroom and wrote a question on the board: Figure out the number of bricks (hexagonal shaped) that can fill this entire classroom. Mr. Amrit started to say, *"This is our today's task for you to do collaboratively."* Perhaps we were staring at each other's faces. He then showed up a brick and threw another question towards us, *"Can you guess how many this type of brick can be kept inside this hall?"* All of us started to whirl eyes around the entire room and observe the brick. Randomly we put our guesses: 10,000, 15,000, 40,000, …, 1,00,000, etc. Mr. Amrit with his half-smiled face, *"Nice job, guys. Let's do today's task. Let's discover how much you are accurate towards your guesses. You can use measuring tapes (by showing some colorful tapes)."* The tasks might be progressed in the following pattern.

We were divided into three groups (three in each group). We had a measuring tape and a hexagonal-shaped brick. In my learning journey and teacher career, I solved numerous problems kept in textbooks and practice books based on surface area and volume related to home arithmetic and geometry. However, the practical usage could be beyond my imagination at the time when I was not able to buy a carpet for my room (lack of life skills). In this situation, I experienced that my formal education could be making day to day living more difficult. For instance, students find it difficult to guess how much water their water-tank contains. They have a very weak ability to guess. Even more, most of them are experiencing difficulties to find the area of their reading-table. This is perhaps against the educational objectives of the nation which talks about easing the lifeworld of the students and others by engaging students in real-worlds and day to day and providing knowledge and skills to thrive in this intricate world.

Continuing the foregoing incident, one of my teammates was struggling with the problem given by the facilitator. He might be mumbling, *"Humm! How can we find the number of bricks that fill this entire room? Is this the task of the students or the teacher? Is this not a task of people who work in construction or experts in such work? Such questions have not been asked in the examination and I am sure such will not be asked in the future too. Why do we waste our time in solving such questions in mathematics without focusing on finishing the course in time?"* In the beginning, I also experienced similar, but the discourses of relating mathematics learning to life could encourage me to engage in the task. Two of us started to convince him. Later, he joined the task.

Our classroom was not exactly rectangular or a square-based prism. In my group, I had to find out the dimensions of that room so that we could figure out the volume. I could experience that some members of other groups even were struggling with 'how to measure'? Due to the irregular shape of the floor, I was confused with measuring the dimensions. Meanwhile, we discussed and found a way to measure the dimensions. For this, we divided the floor into two parts. The first part consisted of the rectangular shape and the other part is the remaining irregular portion. Now, I could measure the length and breadth. This way, we happened to figure out the area of the rectangular portions.

Now, finding the area of irregular shape appeared to be a pain in the neck for us. Since I was teaching calculus at the bachelor level, I put my thoughts on using the integration method. But it was again difficult because there was no function or curve so that we could integrate and find the surface area. We brainstormed, discussed, and shared different ideas. Later the concept of integration worked through which we divided the portions into small rectangles or triangles and measured the dimensions of each to find the area and added to find the area of the whole floor. In doing so, I applied the concept of integration in real-world problem-solving. From that on, I became aware that the concept of integration can be applied

to discover the area of regular and irregular lands. Finally, we added up the two values and found the area of the floor. Multiplying this value with the height of the room, we found the volume of the room. The next task was to figure out the volume of the hexagonal bricks. We collaboratively measured the dimensions of one brick and found out the volume. After having a collaborative discussion, we divided the volume of the room by the volume of one brick which gave us the approximate number of the bricks our classroom consists of.

For me, academically it was a new experience though I involved in measuring kinds of things while doing household work. I was perhaps interacting with life skills through the learning process. Some of the ideas were: the usage of our imagination, the exploration of divergent thinking skills that might promote the skill to search diverse solutions to a problem, the teamwork, the power of creative and imaginative thinking, and the meaningful learning happening in the real-world context. Although there are other brilliant contexts of progressive learning, this might be one of the representative activities for learning to apply knowledge in the real-world context, for making learning lively and enduring, for discovering innovative ideas to solve problems, and eventually for constructing holistic learning experiences.

The narrative I portrayed could be a very basic idea of implementing project-based learning while teaching academic contents. I consider project-based learning as an umbrella term for empowering pedagogical approaches such as inquiry-based learning, problem-based learning, problem-solving approach, etc. Subscribing to the view of Goodman and Stivers (2010) view, project-based learning is built upon learning activities and real-world centered tasks that have brought challenges for students to solve. By doing this, students are likely to become reflective, responsible for the outcomes; fosters decision-making abilities; become creative and critical; and develop essential knowledge and skills. This might be possible through the use of inquiry to solve real-world issues by developing 21st-century skills, a fusion of the three R's (reading, writing, and arithmetic) with the fours C's (communication,

collaboration, creativity, and critical thinking) (Goodman & Stivers, 2010, as cited in Tyata, 2018). It might be authentic to discuss because project-based learning consists of five key features: a driving question, participation in authentic and situated inquiry, engagement in collaborative activities, scaffold with learning technologies, and set of tangible products to address the driving question (Blimenfeld et al., 1991, as cited in Tyata, 2018). With this, project-based learning, I take into consideration, to involve students to bridge learning and life that eventually might lead them to lifelong learning. A study carried out by Tyata (2018) on 'Project-Based Learning for Engaging Students in Mathematics' through an action research project found that project-based learning is an appropriate pedagogy for engaged learning, motivation, and engaging them through questioning, collaborative work, discovery learning, and concept mapping. Similarly, he found that students develop proficiency and awareness in connecting life and mathematics.

Taking lifelong learning into account, I refer to sustainable learning. The concept might fit well with what Graham et al. (2015) say about sustainable learning. They admitted that sustainable learning is learning for all, teaching that matters, and learning that lasts. In this, the effective pedagogies pay attention to students' cultures and their interrelationship with places, families, communities, the world, and the cosmos by focusing on the individual differences/uniqueness and capabilities. In a more pragmatic sense, I consider learning as an integrated and interdependent and should be interdisciplinary in nature.

With this, I could see the interconnection between my non-academic lifeworld and the academic world with the effective implementation of enabling pedagogical approaches. This seems visionary when learners become their own teachers or independent learners, teachers become facilitators, and learners become investigators through an inquiry process. In so doing, the classroom practices that involve questioning or inquiry-based approach seems imperative. A study carried out by Dahal (2017) found that the curricular practices in Nepal

present evidence that teachers and assessment tools are habituated with asking lower-order thinking skills related questions mostly remembering and understanding. However, he found that asking higher-order thinking skills-based questions triggers and motivates students' creative and critical thinking. Yet, asking higher-order thinking skill-related questions by residing learning towards examination does not seem appropriate. In this context, it would be effective to implement inquiry-based learning by asking essential questions that are open-ended, are thought-provoking and intellectually engaging for sparking discussion and debate, call for higher-order thinking, point toward important, are transferable ideas within and across disciplines, raise additional questions for sparking further inquiry, require support and justification, repeat over time, are provocative and generative (McTighe & Wiggins, 2013). This might be how learners can themselves turn into an inquiry process to become a self-inquirer and researcher.

I found that the rich context with a wide range of learning opportunities appears to be so powerful in the construction of knowledge where a learner learns from her/his prior experience and modifies the meaning to form a new version of knowledge. In this, Kolb (1984) commends that learning by experience is required for authentic learning since experience is the driving force to construct an empowering version of understanding. In a practical essence, I advocate that learners should foster this quality from home. I found, while engaging in developing teaching and learning resources for ECD teachers and students, that learning activities central to addressing the lifeworlds of students by integrating the tasks that engage students in learning by doing context. For instance, the teacher can encourage or challenge students to take the measurement of household stuff; figure out the various geometrical shapes in the daily used objects; take the survey of his/her family's monthly income and expenditure; collect the data from a nearby shop by illustrating one

week's/month's transactions; guess the measurement and capacity and test them by conducting experiments; to illustrate but a few.

In the need of learners to design the solutions to various problems, I have experienced that learning activities fostering students' heart, mind, and body are seen to be essential. For this, some strategies can transcend progressive methods of teaching. One of them is design thinking. Looking into practical problems, we have been facing myriad global challenges such as several pandemics, pollutions, global warming, cultural extinctions, cybercrimes, terrorism, mass economic crises, to name a few. For this, I think there might be a need of educational approaches that encourage and engage students in real-world problem solving and this has to start by encouraging students to solve their daily problems from early school grades.

Design thinking is a process for creating something (artifacts or knowledge) which is both an art and science for human-centric problems (Buchanan, 2001). Thus, it refers to the thinking skills and practices of designers that are used to create new ideas and solve real-world issues (Cross, 2011). Similar to this, Kelly (2012) argues that designed thinking in education is a process of learning that comprises active problem-solving and mastering one's ability to create impactful change thereby building creativity that is both resilient and highly impactful. In this view, design thinking can be helpful to promote innovation, problem-solving, and collaboration (Watson, 2015). Considering it as a process, there is an iterative,

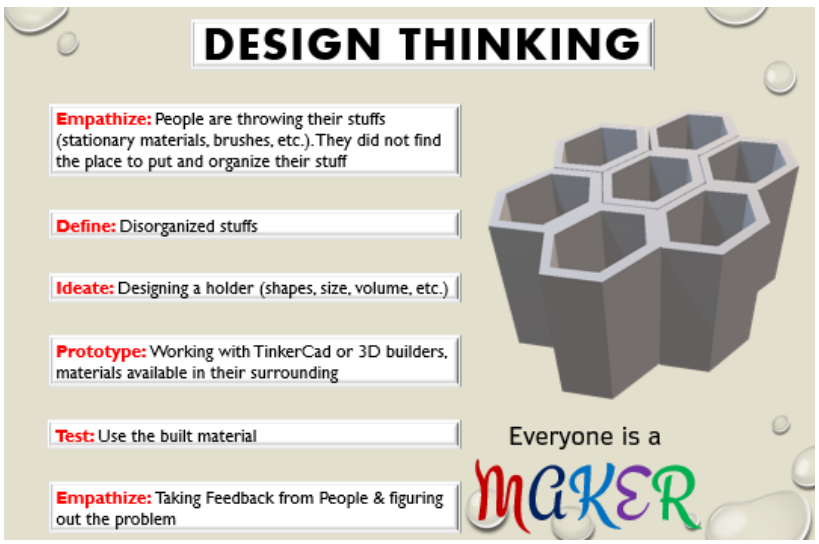

Figure 40. One practical example of design thinking

dynamic, and non-linear framework consisting of five steps: empathize, define, ideate, prototype, and test all central to engaging students in hands-on design challenges for solving a problem.

Perhaps I have seen it as a dynamic method that is likely to be guided by constructivist learning theory. I take this into consideration to transform our practices to embrace the interdisciplinary and transdisciplinary curriculum and pedagogical practices. As problem-solving needs the ideas and skills of diverse disciplines and contexts, design thinking as a method seems to be essential in effective learning. This is probably guided by Habermasian practical interest wherein the collaboration during work and consensual understanding while coming to a conclusion or developing a product matters abundantly.

The next essential idea could be entrepreneurial learning. I started my small business or startup (restaurant) before joining KU. I established this without having formal certification in business or commerce. Mostly, my weak economic situation might lead me to jump into business because I had a perception that business is the only way to earn a better amount of money and live a better life (as far as money is concerned). This is seen to be rooted in our culture. You might have experienced a quote 'पैसा कमाउने भए विजनेश गर वा सरकारी जागीर खा' (translation: if you want to earn money, do business or government job). My restaurant was a collaborative endeavor I started and involved myself in working with people of similar interests. It was for profit-making purposes. However, we were/are providing jobs for more than 30 people. Most of them are pursuing their higher study. In this regard, there appears a space for social entrepreneurship as people are getting benefited by the services.

When I encountered entrepreneurial learning and entrepreneurship, I found it effective to be integrated into the curriculum from an early grade level. This seems possible when we provide a rich environment for our students to develop business-related knowledge and 21st-century skills. This might be imperative for every learner in order to come up with an

innovative idea, risk-taking abilities, and skills of turning ideas into actions. In the context of Nepal where small businesses are growing up including several challenges, our curriculum and curricular practices might incorporate such skills. As I discussed in the previous chapter, experiential learning for entrepreneurship is required wherein entrepreneurs learn from one another and by other's experiences. For this, pedagogical practices, I think, could be based more on an experiential learning framework.

STEAM Education as Pedagogy

Incorporating all of these ideas such as arts-based pedagogy, ICT-integrated pedagogy, progressive pedagogies (project-based learning, problem-based learning, inquiry-based learning, etc.), design thinking, and entrepreneurial learning, I found that STEAM education can be one of the emerging pedagogical concepts that might have blended all these ideas and practices. This progressive vision of education is seen to be spreading all around the world and is likely to transform educational practices.

I elsewhere articulated that my learning journey from school to undergraduate level might survive exclusively focusing on mathematics or so-called pure mathematics. In school education, science was also in this category. I could develop a sense of taking these two subjects as hard or difficult subjects from my early school grades. It might be grounded in other people's beliefs too. They oftentimes express that mathematics and science are life securing subjects, your future will be saved if you are excellent in mathematics and science, people praise someone who is a doctor, engineer, or mathematician or likes. Due to this context, I might become extremely political whilst learning. After my SLC, I chose mathematics as a major subject because my mind was probably contaminated by those sacred sayings of people emphasizing the scope of mathematics teachers: mathematics as a lifesaver subject. This prioritization had perhaps led me to become egoist towards mathematics by

putting other subjects or disciplines down. This way, I could develop disciplinary egocentrism believing that every knowledge is objective and separated.

During my MEd in mathematics education, I somewhat was able to understand the subjectivity of knowledge by developing a consciousness that every knowledge is grounded/embedded in a respective context and culture. To accept something as a piece of knowledge, I need to understand the context. This means that I can understand one thing in the presence of another. There is possibly nothing that exists independently or separately. For instance, a male is only possible in the presence of a female. Meaning that the phenomena co-exist. They are interdependent, integrated, and interrelated. I took a shift in my thinking and action because previously I believed and practiced mathematics as a separate discipline. With this revised perception, I joined the STEAM education program to complete my MPhil and conduct a research study.

The beginning days were challenging for me to accept an integrated and multidisciplinary/ interdisciplinary outlook of education. With some initial discourses on STEAM education, I came up with a layman definition of it such as an educational approach that blends science, technology, engineering, arts, and mathematics to teach academic content. This might be pertinent to understand that STEAM is the integration of science, technology, engineering, arts, and mathematics. It was initially STEM, without A(arts). The most common and essential four subjects: science, technology, engineering, and mathematics are inextricably connected, and the STEAM approach is supposed to present contents through the usage of arts. This possibly seeks an integrative nature of the curriculum.

Figure 41. Engaging students in a STEAM challenge

The most common problems of people perhaps require knowledge and skills of multiple areas to solve. Are there any real-world problems that can be solved by mathematics only or science only? For instance, the excessive cold season is everybody's problem. Now, to solve this problem, anyone needs mathematics to understand the temperature, volume of cloths, etc.; science to discover the answer to the problems and to explain how things (heater, heat, clothes, etc.) work; technology to use the technological devices (heater, AC, etc.); engineering to find and design the solutions to the problem by using science, technology, and mathematics; and finally, arts to understand the sentiment, expression, and condition of people. So, *what if a person has knowledge and skills of all of these disciplines/subjects?* Probably s/he can solve such problems on her/his own. People might not need experts of mathematics, science, technology, or engineering. This appears to be the central focus of STEAM education as an approach aiming at involving/engaging students inclusively in an authentic problem-solving situation so that they could develop life-affirming skills.

Arriving at this stage, the STEAM approach usually places its learning around some phenomenal pedagogical approaches such as project-based learning, inquiry-based learning, problem-based learning, problem-solving approach, to name a few, wherein students strive for solving problems. Design thinking is a strategy for the STEAM-based approach where students are given problems to be solved by design activities. This is also needed in the contemporary world where the world is facing several global challenges. In this context, STEAM education engages students in transformative learning, which is based on five interconnected ways of knowing: cultural self-knowing, relational knowing, critical knowing, visionary and ethical knowing, knowing in action (Taylor, 2015). Considering this vision, learners become a transformative change agent who is capable of making sustainable changes by solving the problems of people and the world. In such a context, learners become responsible citizens of the world. While doing this, learners are capable of raising critical

voices against themselves and others regarding the disempowering, distorting, hegemonizing, unethical, and socially and environmentally unjust practices. Accepting the whole world as a global village, STEAM education fosters each individual to be critically conscious in every action they perform. Here, the transformative vision of education seems possible through STEAM education.

My quest for education took this step to transform my thoughts and actions towards embracing a transformative STEAM education. With this educational approach, I am hoping that this will address the contemporary problems faced by the education system and solve the existing real-world problems mentioned elsewhere. I have seen a better future with STEAM education as a pedagogical approach.

In this entire discussion of subscribing to several progressive methodologies of teaching and learning, I am not being prescriptive for their implementation. It might be dependent upon the learning contexts, multiple abilities, and interests of students, and central to help them become lifelong learners. Thus, the egalitarian perspective might be effective for teachers to choose one or more enabling pedagogies to foster their students' learning and sustainable progress. At this moment of inquiry, with deep introspection, I was celebrating very successful stories (my and s few other's academic success) without being critically aware of those unsuccessful stories. However, I tried to put myself at the center of the changing movement to shift my vision and mission towards embracing democratic and transformative practices of education.

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My Possible Shift in Embracing Transformative Curricula

The foregoing discussion depicted how I shifted my thoughts and actions towards the transformative vision of education. They were the contextualized nature of education, progressive pedagogical approaches, technology integrated methodology, and STEAM

education as an approach. Now, it remains to talk about another shift which is about the transformative curriculum. This might be again a radical shift in my understanding from the traditional nature of the curriculum, which is informing, contents loaded, expert-driven, centrally designed, and culturally decontextualized. Subscribing to the curriculum images as discussed by Schubert (1986), in this section, I discuss some of my empowering curriculum images that probably will help me develop a visionary education system.

As far as I remember now, during my intermediate (10+2), I encountered the word 'curriculum' for the first time. This was in the course 'Curriculum and Evaluation'. Merely reading and rote recalling some definitions and etymological meanings of curriculum provided by experts and educationists would not give me the broader sense and experience of the curriculum. The definitions provided by educationists such as Hilda Taba, Ralf H. Taylor, to name some, were considered to be essential while writing the answer to the questions of this course. Due to this context, I developed the notion of curriculum as a textbook or curriculum as a subject to be studied. Secondly, when I was in my bachelor level, I developed the notion of curriculum as a list of contents since contents are the drivers to conduct the whole academic year. Perhaps, the initial phase of my teaching career went by following the textbook, imitating my teachers by pursuing their legacy of teaching, and finishing the course of contents in the allocated time. Till 2016, before joining MEd, I might be unknown the contextual meaning of the curriculum except for some definitions.

In the year 2016, the second semester of MEd, there was a course Curriculum in Mathematics Education. This time, I interacted with Schubert's (1986) curriculum images, which could provide me with a contextual orientation to understand curriculum through metaphors, and this, therefore, might become the turning point to shift my beliefs of traditional views of the curriculum. I take this as a golden opportunity to understand curriculum through multiple lenses such as informing, reforming, and transforming.

Engaging myself in critical discourses, reading several scholarly materials, interacting with facilitators and colleagues (dialogues), reflecting on my experiences, and involving in designing a curriculum informed by Habermas' (1972) knowledge constitutive interests might inculcate in me the meaningful understanding of transformative versions of the curriculum. In doing this, initially, my beliefs regarding curriculum were governed by 'informing' notions or traditional views of curriculum: curriculum as a list of contents, curriculum as cultural reproduction (that is reinforcing established classroom and social standards and power structures), and curriculum as discrete tasks and concepts as discussed by Schubert (1986). I found that these curriculum images put emphasis on curriculum as a material or body of texts and as an end where students are means to accomplish their goals and objectives. In this, the curriculum appears to be an expert to promote traditionally ill-defined disempowering curricular practices guided mostly by Habermas' technical human interest. Moreover, this might be aligned with the reproduction outlook which seeks the status quo, generating a product that is normative, controlled, and manipulative. At this stage of inquiry, I am critical about the potential drawbacks and advantages of such a nature of the curriculum. In my experience, the curriculum of Nepal whether it is mathematics or the curricula of others seems to be heavily guided by this perspective. This could be because the curriculum is blamed for being centrally designed, expert-driven, and dependent on foreign aid. Arriving at this stage of inquiry, I raise some questions to myself. *Is this sufficient for 21st-century education? Does such a curriculum address the needs of learners, society, and the world? How? Is this type of curriculum responsible for a creative and critical citizen? Why?*

Another nature of curriculum I experienced was the curriculum as a process. This nature of the curriculum is seen to challenge the traditional nature of the curriculum by embracing the reform in individuals and society. I could say that such a nature of curriculum might be associated with progressive education that believes in experience and activities

promoting meaning-making through interpretation. John Dewey's experiential learning can be taken into consideration while developing a curriculum. Dewey (1892) advocates that curriculum should reside in a means-ends continuum wherein curriculum is taken as a means to facilitate students learning (ends) where experience is considered as an integral part of both process and outcomes in educational practices. In this point of view, I put curriculum as experience (building knowledge and skills based on students' prior experiences) discussed by Schubert (1986) in this category. From school to undergraduate, as a student, I got very few opportunities to involve in collaborative activities, discussions, interactions with teachers and students, and mostly the meaning-making process. As a teacher also, I did not extensively allow my students to engage in rich tasks and activities, Extracurricular Activities (ECA) and Co-Curricular Activities (CCA) wherein they could use their all the senses in the meaning construction process. This situation is likely to present that the practical human interest is not on the surface or my students and I would not get chances to engage mostly in participatory activities. Therefore, my engagement in MEd and MPhil in curriculum-related courses, activities, and some other workshops helped me to widen my knowledge/skills to understand and enact such curriculum in my practices. Next, I experienced some pitfalls of this nature of curriculum whilst viewing it from critical lenses. It is considered that there is always a limitation, coercion, or boundary during the performance of activities and coming to consensual understanding because everyone's voice would be heard but not taken into consideration in the decision-making processes. In this context, I ask questions like *what about an individual's autonomy and responsibility? Are students conscious of what is happening in their society? What about an individual's uniqueness regarding their needs, ability, and intellect? Are students critically aware of what actions they are performing in their everyday life?* In this context, a curriculum guided by transformative sensibilities is likely to address such issues.

When I was in my MEd journey, I was exposed to profound situations wherein I had to critically reflect and critically introspect upon my doings, beliefs, values, and assumptions as a learner and teacher of mathematics. While doing such, on one hand, I became aware of educational practices around me. I found the practices were under the domination of some fixed and taken-for-granted assumptions. In my experience, we seem to be blindly following often disempowering, stereotypical, and hegemonic traditions without questioning them. In my experience, these practices are likely to be responsible for resisting equity, inclusiveness, freedom and autonomy, and eventually empowerment of the people. On the other hand, I became aware of my actions towards myself, my society, and the world. I found myself, in many ways, unsuccessful in figuring out my inabilities to recognize myself as a person, as a learner, and as a teacher; my role in my society and education; my responsibilities towards bringing a change. In this spectrum, I consider curriculum as a means for the holistic development of a learner and society. So, curriculum as social reconstruction and curriculum as currere are keen to address such issues. Curriculum as social reconstruction could be effective to re/construct society for people and other living beings to make it a better place. Its education's role to prepare human resources who are capable of solving existing problems in the society cultivating the awareness to advocate against unjust assumptions, cultures, and rules and regulations. By this, I consider education as a political act.

Etymologically the meaning of curriculum began with the Latin word *currere* which means 'to run the course' or 'running the race on the road or ground'. In my understanding, the road could be taken as a curriculum, the learners are the racers or players, running is learning process, and destination as educational goals. In this perspective, the learner is responsible for his/her own thoughts and actions. The writing of an autobiography could be helpful for each learner to recognize him/herself, to learn from the past through self-reflection practice, and create visionary directions for the future. This is, I consider, for fostering personal

development analyzing past actions and envisaging possible prospects (Pant, 2015). Here again, learners are actively constructing meaning freeing from the coercions by understanding his/her abilities to thrive and becoming a visionary person. During my journey in MEd and MPhil, I have got ample opportunity to write my own stories, narratives, including my highs and lows; critically reflect upon my actions; and make a visionary plan to become a change agent. Through writing, discussions, discourses, workshops, etc., I was engaged in figuring out my inner self by raising the questions; *who am I? What is my purpose in life? What is my responsibility in education?* With such engagement, I could, in many ways, figure out myself and my interconnections with others.

These two curriculum images: curriculum as an agenda for social reconstruction and curriculum as currere perhaps aligned with emancipatory human interest as discussed by Habermas (1972) and Schubert (1986) which seem to be pertinent to praxis-based curriculum unlike product and process-based nature of the curriculum. By praxis-based curriculum, I mean that curriculum emphasizes the commitment to social justice, critical reflection, individual as a change agent, ideal speech situation, and genuine consensus. In my opinion, critical reflection comes alive while we turn our ego into ourselves by raising the critical questions against our existence by freeing from unfree existence and structure and by taking responsibility for every action we perform. Change agent is a concept related to recognizing the status quo within ourselves and existing in the outside (society), developing an oppositional attitude, advocating for change (radical), and becoming a visionary. The concept ideal speech situation refers to the ability of a person to minimize environmental restrictions, systemic/structural constraints, and maximize equity measures. Finally, the genuine

consensus is akin to the ability to recognize power disparities, making every option available for discussion and debate, and making critically conscious judgments.

At this stage of this inquiry, I believe that I could transform my understanding of curriculum from different vantage points while involving in the continuous critical

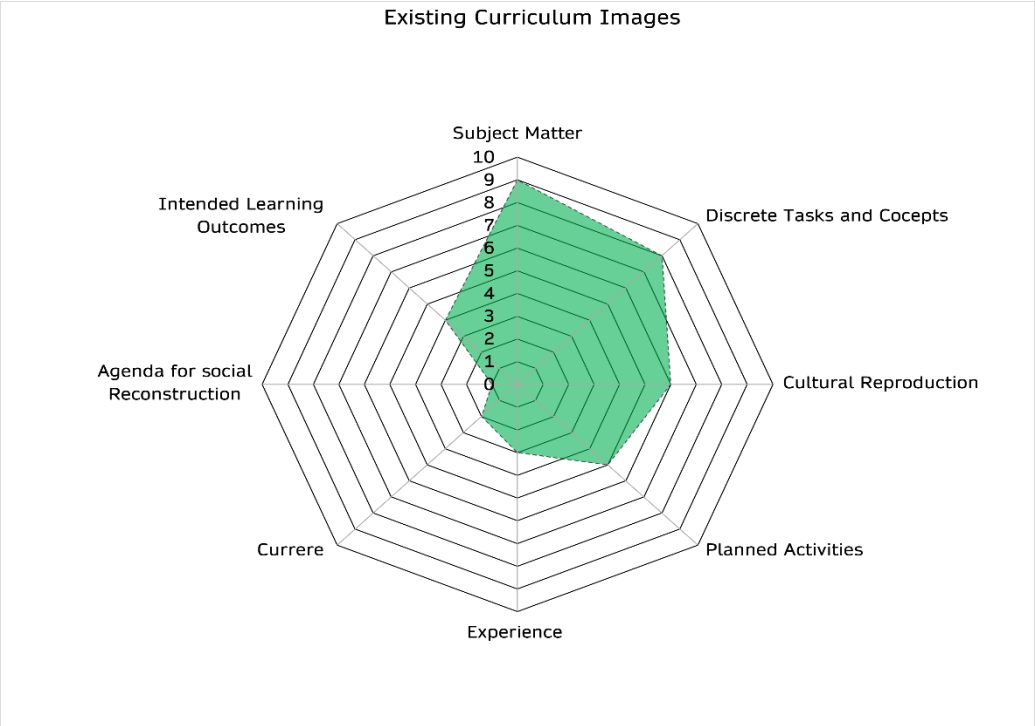

Figure 42. Existing curriculum images

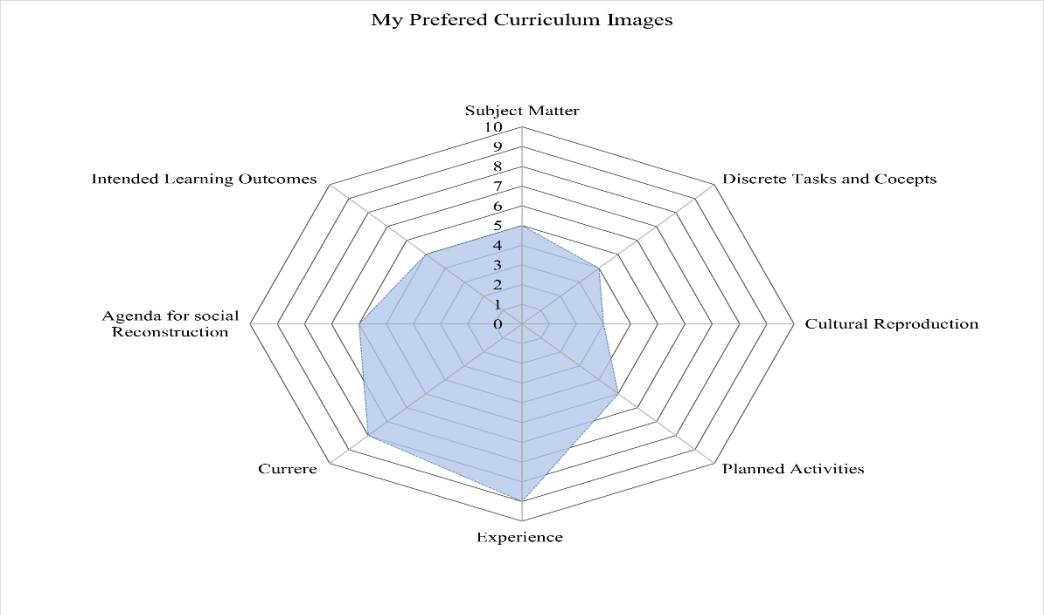

Figure 43. My preferred curriculum images

discourses, discussions, debate, writing, etc. My preliminary and raw understanding of

curriculum as a list of contents or subject matter to be taught has now been changed to take progressive to transformative versions of the curriculum. You can view my shift in the pictures above. I am not rejecting the importance of a product-oriented curriculum being one side of the coin. By then, I am empowered to make my vision towards balancing these three natures of the curriculum by emphasizing the transformative vision. This way, I am destined to embrace such a vision of curriculum for envisioning an education system that is likely to make this world a better place.

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Reflecting upon the Research Question

The focal point of this chapter was to portray my possible transformative shift in thoughts and actions by unfolding my lived experiences during my MEd and MPhil. The separate sections but interconnected were developed to discuss this shift which might give the sense of transformative sensibilities to become a change agent. Thus, the entire chapter was designed to address the third research question of this inquiry which was: In what ways have my Masters' and post-Masters' experiences developed me as potentially a transformative learner, teacher, and teacher educator? At this stage of writing, I feel that my discussion depicted here and lived experiences could embrace this transformative shift being a learner, teacher, and teacher educator in the field of educational transformation.

CHAPTER VI

ENVISIONING FUTURES WITH STEAM EDUCATION

Chapter Overview

In chapter III, I focused my discussion on portraying the conventional nature of education characterized by mostly behaviorist mode of educational practices that appeared as unhelpful and disempowering enterprises in my academic world (from school to undergraduate level). The chapter presented that the archaic model of education possibly guided by absolutism, a pure body of knowledge, universalism, etc. could not fit for the emerging context of pedagogical transformation in Nepal. Elsewhere in this chapter, I presented my vision of improving assessment, pedagogy, and curriculum for embracing the inclusive and sustainable features of education that have capabilities of promoting change and empowerment in the society.

In Chapter IV, I presented my non-academic lifeworlds from my birth to before entering Kathmandu University by centralizing the discussion on how these lifeworlds could be dynamic pursuits to promote education governed by holistic educational practices. Thus, the central focus of this chapter was on how/why to connect the lifeworlds of students in formal educational practices. The chapter also emphasized how/why the educational practices (discussed in Chapter III) were unsuccessful in capturing the lifeworlds based on students' socio-economic, political, cultural, etc. contexts. For this, we need a visionary approach to address such issues. I tried to put my emphasis on some visionary practices of education throughout this chapter such as contextualization, fallibilism, arts-integrated education, technology-blended education, entrepreneurial learning, to illustrate a few, which are likely to synergize local and global worldviews – a glocal perspective. Instead of viewing these ideas

separately, I need to envision an education system that has the potentiality to embrace all of them.

In chapter V, I depicted my transformative shift in thoughts and actions developed in my academic journey of MEd and MPhil in mathematics and STEAM education respectively to become a transformative learner, teacher, and teacher educator. The focal point of designing this chapter was to connect my academic and non-academic lifeworlds thereby emphasizing on cultivating transformative sensibilities within my personal and professional practices. As a change agent, I tried to discuss some visionary educational practices including their critical aspects such as technology-blended pedagogy, culturally responsive teaching (ethnomathematics, fund of knowledge, etc.), arts-integrated education, progressive pedagogies, transformative vision of curricula. Still, I find these ideas incomplete without a visionary educational framework to put them into action.

Elsewhere in the previous chapters, I endeavored to bring some contemporary ideas of re/designing education system in the context of Nepal by discussing the limitations of some disempowering practices. All of these ideas still need a concrete vision to embrace a radical shift or change in our education. So, this chapter is my creative imagination of futures, for there is not just one future, but there are many futures. In so doing, I delve into addressing my fourth research question of this inquiry: How have I been envisioning a system of education for pedagogical transformation in the context of Nepal? In this regard, I articulate my vision of futuristic educational practices comprising the nature of the future curriculum, the future pedagogical practices, the future school, the future teacher, the future students, and the future assessment system.

Whilst delving into my envision, I am engaging in a semi-fictive imaginative genre of writing (letter writing) mostly governed by my lived experiences and my creative and critical

imagination of the future of education. Hence, this is the fusion of my experiences and imagination.

The Education of the Future(s): Making a Vision for Inclusive STEAM Education

It could be any recent day of December 2020. The winter had just come. Inside my room, near a large sliding window, I was expecting sunlight to touch my body, probably cultivating some genuine ideas to write about present contexts of the education system of Nepal. In the midst of the coronavirus pandemic, educational practices seemed to be reopening. I think this pandemic might teach us the values of our health and healthy environment (ecological consciousness) as well as the need of an effective education system that might help develop essential skills in learners to deal with real-world challenges or local and global crises. On top of this, people might have experienced the value of technology integration as the online mode of education could be only the means of conducting educational activities in this pandemic. In this phenomenon, people were likely to start rethinking about an empowering education system for the next moment or sustainable futures.

In the process of writing about the present education context of Nepal, I encountered a national policy prepared by the Ministry of Education. In this policy, they have mentioned the implementation of STEM (without arts) education and curriculum. The integrated curriculum for grades one to three was already in implementation all over Nepal. Now, this policy of enacting STEM education made me think about the past, present, and future of education. Being an MPhil scholar in STEAM education, I found this a noteworthy shift in education but not so practical as it is ignoring Arts. As an advocator of interdisciplinary and transdisciplinary STEAM education, I found STEM is insufficient when it comes to human values, ethics, emotions, and imagination. Being mindful of this concept, I decided to write a

letter to the Ministry of Education (Minister of Education) by articulating my vision towards a transformative STEAM education.

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To,

Ministry of Education,

Kathmandu

Dear Education Minister,

Based on my experiences of being a teacher educator, a research practitioner, and a university graduate, this is an excellent opportunity for me to think and develop a vision of effective education. Through this letter, I am presenting my vision of transformative STEAM education for the sustainable future(s). I hope you will find this letter and my vision helpful to think and act on building a novel education system in the context of Nepal. While portraying this vision, I would be sometimes objective, and I might support the reproduction nature of education. This might be because of the academic and non-academic practices where I grew up. Humbly and with humility, I take this as my limitation.

You are probably aware of the fact that STEM has been kept in the education policy and soon to be enacted with the development of the curriculum. I feel that, however, STEM without arts is insufficient in terms of capturing human values, ethics, and various affective and spiritual attributes. On top of that, education might become unsuccessful in many ways to develop higher-order abilities such as critical thinking and creativity through STEM without arts. Talking about the positive side of educational programs, an integrated curriculum for grades one to three is in the practice. This, I think, a quality step in education to blend the academic and lifeworlds of students. Nevertheless, there

are bitter experiences and beliefs of people about its effectiveness without the proper professional development programs and preparation of resources. Moreover, I do not hope so much from the nature of curriculum integration that is advocated by the present integrated curriculum which largely focuses on multidisciplinary nature and it seems to be the least integrative in comparison to the interdisciplinary and transdisciplinary curriculum. Yet, I took it as a positive sign towards a drastic change in the education system. Without neglecting the multidisciplinary nature of the curriculum, I want to focus on the interdisciplinary and transdisciplinary nature of the integrated curriculum wherein students' meaningful experiences are naturally amalgamated to solve an authentic problem.

Based on my involvement in many areas related to integrated curriculum and transformative education, I have portrayed my vision illustrating the contexts here and there in the past, present, and future. Let me articulate my vision here.

The Nature of Integrated Curriculum: Everything is Connected!

Dear Education Minister,

Let's reflect upon our experiences of education in the past years or decades. Formal education was seen to be separated from the lifeworlds of people as if academic subjects came from different and segregated planets. Students used to study eight or more subjects with separate teachers in the archaic model of education and curriculum that might be unsuccessful in many ways which emphasized on compartmentalization of subjects thereby forcing students to learn in a narrowly conceived and bounded criterion or objectives of the separate subjects. In this context, a student who is learning mathematics does not seem to be able to see the link while learning the concepts in science, however, they are interconnected. Moreover, you might have also experienced that students are not likely to be capable of real-world application of those ideas and skills learned in the formal academic setting. For instance, a student's family has a vegetable garden and his/her parents are in the business of

selling those vegetables in the local market. However, I experienced that s/he might not have the ability to help parents in their household chores and business with those formal academic experiences. The situation might present the context of how formal education and lifeworlds of students are accepted as distinct matters. In this situation, you might have experienced a big failure of our education as there are issues such as disengagement, disinterest, negative attitudes, raising dropout rates, unemployment, among other critical issues. As a result, that seems to be a factor to negatively affect the progress of an individual as a person, society, and the world. Although I might be overly emphasizing the existing problems, but, from my present vantage points, these appear to be long rooted in our education system.

Given this past scenario of our education, there are changes in the present context of school education. I respect that the Ministry of Education is trying to have a discussion with local people, experts, and stakeholders to make a shift based on the global perspective of education. As I discussed earlier in this letter about the implementation of the integrated curriculum, the contemporary curriculum seems to be governed by the notion of interconnectedness. Guided by a holistic educational philosophy that every element in this world is interdependent – one can exist depending upon the other. This is true that we all are the parts of the same intricate web of life, the notion that there is a purpose for every life in the universe, and the conviction that there is a continuous plan of evolution in which we are all involved (Nakagawa, 2018; Rudge, 2008).

Coming to the notion of curriculum integration, from one point of view, there appear to be three forms of curriculum integration: multidisciplinary, interdisciplinary, and transdisciplinary. If we put these in a continuum of curriculum integration, multidisciplinary nature is characterized within the least integrative form of integration which involves the knowledge, processes, and skills of more than one discipline. In this regard, our integrated curriculum seems to be heavily guided by the notion of multidisciplinary integration. Let me

take an example, 'kitchen garden' could be a theme. Now, the concepts and skills of several disciplines or subjects can be developed centralizing this theme. The teacher is able to teach several concepts of science (soil, plant, environment, etc.), mathematics (area, height, patterns, numbers, basic operations, etc.), engineering and technology (designing the plot, researching through the internet), and arts (making garden appealing to other or could write poems/songs or make a painting of beautiful kitchen garden, the humanity of being together, etc.). The subjects or disciplines are organized in a theme rather than an orientation towards an authentic problem (Wickson et al., 2006). So, I found this might be unsuccessful in terms of solving authentic problems. This approach of curriculum integration might not be so much helpful because there is still space for separate disciplines to be predominant or we can still separate the disciplines. *How can teachers integrate real-world problems faced by students and the larger community of people? What could be the nature of the integrated curriculum that focuses on project-based and problem-based learning?* In this regard, I present my vision of an integrated curriculum for the future.

Dear Education Minister,

Interdisciplinarity and transdisciplinarity natures will be the features of my integrated curriculum although I am denying the unhelpful aspects of these natures in the context of Nepal. Let me discuss these concepts in a detailed manner. The interdisciplinary lies middle in the curriculum integration continuum but slightly moving towards transdisciplinary notion. This approach perhaps emphasizes on common interdisciplinary skills and concepts embedded in disciplines wherein knowledge is socially constructed having many right answers (Drake & Burns, 2004). In this approach, students and teachers involve in collaborative projects to address specific 'everyday' problems and, as a result, encourage students to create new knowledge across the disciplines to cross boundaries (Stock & Burton, 2011). For instance, the above example (Kitchen Garden) can be applied in interdisciplinary

teaching and learning if we allow students to ask questions across several disciplines with the motto of cultivating interdisciplinary skills and we put some real-world issues like how you would save your kitchen garden from predators. What happens to vegetables, when suddenly the weather changes? This might enrich students' 'thinking out of the box' skills with real-world application of knowledge.

Talking about the transdisciplinary nature of the curriculum. This probably is a paradigm shift in curriculum integration which might fundamentally focus on a real-world problem-solving approach (e.g., through project-based learning) wherein students are encouraged to develop life-affirming skills as they apply interdisciplinary concepts and skills in a real-life context (Drake & Burns, 2004). This might often go beyond the disciplines while producing a new perspective (Gibbs, 2015). Students, whilst solving authentic problems, could develop creativity, ingenuity, curiosity, imagination, critical thinking, productivity, and accountability. Let's understand this through an example. I think you have not forgotten the 7.5 rector scale earthquake in 2015 in Nepal yet, *have you?*
If not let us think about a project. The project can be following:

The earthquake that occurred on April 25, 2015, with a magnitude of 7.8 rector scale and the epicenter being place A in Nepal claimed many lives and severe damages. Earthquakes can happen frequently and anytime (minor or major earthquakes). Now, you and your team's job is to determine whether or not another earthquake of a 10.0 (or double 15.6) magnitude could ever happen in place B including: predict the epicenter; discuss the potential impact on people's lives, place's infrastructures, economics, education, etc. Gather the information/evidence by talking to higher authorities or people in the community or use technologies to explore the facts and solutions (how to minimize the impacts on life and the environment). Also, come up with some models or representations (pictures, paintings, etc.) to portray your creative imagination of the future which is/are useful to minimize the impact

of the earthquake. Moreover, create a model of an earthquake-resistant village or city (including the design of homes).

Thus, this might be one example in which students can be engaged in project-based or problem-based learning scenarios by interacting with the world around them that integrates concepts and skills of multiple disciplines, a problem-solving approach through real-world application experiences, and essential 21st-century skills including metacognitive and creative imagination skills.

By supporting the above discussed ideas and concepts, I advocate the integrated approach to teaching and learning drawn from the integrated curriculum – the notion that the whole is always greater than the sum of its part. My emphasis here is on the problem-based centralization of the curriculum as Beane (1995) discussed that curriculum integration begins with the idea that the sources of curriculum ought to be problems, issues, and concerns posed by life itself wherein concerns generally fall under self or personal and issues and problems posed by the larger world. In this case, interdisciplinary and transdisciplinary approaches seem to be appropriate. In doing so, I am not against multidisciplinary curriculum integration because it could be the starting point of a shift in education.

Let me discuss some other features of the curriculum based on my vision. I am a bit against the centrally designed nature of a curriculum. Rather, the curriculum can be locally and contextually designed based on the guidelines provided by the CDC under the Ministry of Education. Thus, the guidelines can be a crucial framework for developing a curriculum synergistically by teachers together with students and members from the community. In this regard, the curriculum now might have become the representation of the balanced nature of local and global perspectives (a Glocal view); modern and traditional knowledge systems; depth and breadth; knowledge skills, characters, and meta-learning, outcomes, process, and praxis; and the mind, the body (including the heart), and the soul. While doing this, the

curriculum appears to be the portrayal of needs of local people, student-centered, and adaptable based on the emerging evolutions in the world. The adaptable nature of the curriculum seems to be flexible and a living document or framework of learning based on what the world is becoming, what it needs, and the best ways to achieve our individual and collective goals through education (Fadel et al., 2015). With this nature of the curriculum, it appears to be able to include potential breakthroughs in the world such as modern technological innovation; to address students' needs, interests, and personal growth goals; and to explore outside the school environment for creating diverse learning opportunities for learners for deep and rich learning experiences.

Another dimension of my vision of integrated curriculum is the value of ecological consciousness which seems to be one of the fundamental elements of holistic education (Nakagawa, 2000). This probably gives rise to the basis for a knowledge system arising from the local cultural practices of people. Zhang (2006) considers the notion of ecological consciousness as 'acknowledging the rightful co-existence of humans and the non-human aspects of nature, thereby realizing inseparable relationships between nature's different forms of lives' (as cited in Luitel, 2009, p. 297). This appears to be necessary to promote Nepali Cultural Worldview offering a basis for viewing, knowing, valuing, being, imaging, imagining, and envisioning the importance of co-existence. For instance, Luitel and Taylor (2005) argued that the primary notion of contextualization of the mathematics curriculum is to ensure the inclusion of local knowledge traditions as the curriculum content. In this context, our multicultural society is more likely to respect all the existences of the world considering one existence is interdependent and inseparable from the existence of the other. In this view, the curriculum could be inclusive and empowering for the culturally contextualized education that helps us incorporate local knowledge and wisdom traditions arising from everyday cultural practices of people.

STEAM as Educational Approach

Dear Education Minister,

Drawing on the integrated nature of the curriculum, here I want to discuss my vision regarding STEAM education as a pedagogical approach.

I consider the inclusion of STEM education in the national education policy as a significant move towards producing human resources who are capable with knowledge and skills to work in highly competitive and high-tech STEM-related workplaces (Taylor, 2016; Hardiman & JohnBull, 2019). Therefore, the movement of STEM education seems to be predominant in many developed and some developing countries. As a result, our education system might be also taking a part in this movement. However, *how could this be possible, without creativity, ingenuity, critical thinking, and imagination, to engage students in STEM activities expecting innovative ideas and products from them? In the midst of crises of humanity and ethical behaviors towards everything in this world, how can STEM be a program to cultivate such values and ethics? Is this possible, without arts, for people/students in STEM fields to solve the social, political (power imbalances in societal aspects), and cultural issues?* Without the amalgamation of arts, I found this program is insufficient in many ways. In this context, I am envisioning a STEAM (including liberal arts) as a pedagogical approach.

Dear Education Minister,

Let's delve into a STEAM-based project. The following project entitled *'Environmental Issues'* for grade eight could be one of the examples.

The project aims to cover the major ideas: environment preservation, pollution including its potential impact on human health and environment, politics, and economics. Students are interacting with peers, people in the community, teachers, experts, and non/government authorities to explore the concepts. Now, the central question is: *how would*

you help people solve the most pressing environmental issues? Why do you need a safe and clean environment? While exploring the concept of preservation, they initiate waste management and recycling programs, research on resource conservation, carry out multimedia campaigns, and conduct awareness programs (street drama, theater, etc.) aspiring to mitigate or eradicate the problems. For exploring about pollution, they carry out surveys to understand the perceptions of people on pollutions, work on an experiment to research the condition of pollution (air pollution, sound pollution, soil pollution, and many more) and adversities of pollution on human health and environment, visit the polluted places, use ICT platforms to explore and present the findings, come up with the solutions (diverse solutions), and present their finding through multiple means (journal/article writing, statistical models, etc.). In the case of politics, they conduct surveys or interviews with various individuals to understand the attitudes of people concerning waste management and land use, recycling, and responsibility of people (whose responsibility?). Finally, to explore economics, students take the data of expenditures in waste management and recycling, talk to parents and other people to learn about the financial aspects of the environmental problems, and present the findings. Later, in another theme 'Our Future', they involve in the collaborative group discussion for the imagination of a future they would like to see or develop. They involve in the creative imagination of the futures with/without the environmental issue and talk to peers to take the view of his/her vision. They engage in developing activities such as they build a smart city or village based on their imagination. While doing this, they create the solutions to existing problems that lead to envision a better world(s) for the future (developing some concrete products). Or they may make recommendations for the futures of the world.

Amongst several such projects which are inclined directly with the lifeworlds of the people, this project can be conducted to implement the STEAM educational model as a pedagogical approach. Combining STEM and arts enables people to create 'interdisciplinary

STEAM curriculum for designing transformative pedagogies that develop students' disciplinary knowledge/skills and awaken their creative self-consciousness, elevate their moral/ethical and spiritual awareness, and empower them to practice environmental justice' (Taylor & Taylor, 2019, p. 1). This might become empowering in terms of education for sustainable development that is guided by an educational philosophy based on a broader spectrum of the public good (Hazelkorn & Gibson, 2017). Similarly, I agree with Colker and Simon (2014) who argue that STEAM helps teachers incorporate diverse disciplines and promote learning opportunities/experiences that allow young children to explore, question, research, discover, and exercise innovative building skills. The above project might capture what Colker and Simon want to express. Stroud and Baines (2019) contend that the traditional model of STEM education gives the emphasis on the theoretical understanding of solutions to real-world problems, however, the arts-integrated STEAM education gives diverse ways for capturing the essence of an endeavor, reframing experiences, and transformative perceptions.

The major focus of STEAM as a pedagogical approach can be to bring real-world problems into academic discourse so that students can solve them collaboratively by developing higher-order abilities. In this, the amalgamation of arts-integrated learning, entrepreneurial learning, design-thinking, reflective practice, etc. might be crucial for producing creative and imaginative human resources for the 21st century. Moreover, I emphasize diverse enabling pedagogical approaches such as project-based learning, inquiry-based learning, problem-based learning, etc. that could foster the essence of STEAM education. This, I hope, might play a crucial role to make significant changes in educational transformation leading to create a better world. Yet, I am not claiming that this is the final, but it could be one of the alternatives.

In the later sections, I talk about the nature of assessment, school, teacher, and student based on the perspectives of STEAM education.

The Assessment: Let me Help Improve Learning

Dear Education Minister,

Let's together explore the following two broad perspectives of educational assessment. The first situation might articulate the past context of assessment whereas the second context portrays my vision towards inclusive assessment practices possibly governed by transformative STEAM education.

Perspective First in 2015

Scene 1: (Principal to teachers) This year, in SEE (Secondary Education Examination), I want at least 25 out 40 students to achieve A+ (highest grade in school education of Nepal) and other students at least A or A-. I have to put their names (with photo and grade) on the advertisement board. This is a serious concern for all of you. Do whatever you like. Take extra classes or put them in tuition classes or we can manage a hostel for them or teach them from early morning to evening (or even in the night). (Pointing to mathematics and science teachers) I want you both to give your maximum time to prepare students to get above 90 in your subjects. So, for the prestige of my school, do the work by hook or crook. I just need the result.

Scene 2: (Teacher to a student) Your marks are decreasing in comparison to previous years. Did you not practice enough? You seem good at solving problems given in the textbooks, practice books, and sometimes given by me, but you are not able to score good marks/grades in the final examinations. You need to give sufficient time to exercising the problems and memorize the information. This year, I want you to score at least A- or A+ in the final exam.

Scene 3: (People in the surrounding to a student) Life is a race and to win this race you need to be extraordinary (getting above 90 out of 100 or A grade symbolizes the extraordinary in our society) otherwise you will be left behind. You are the prestige of your (our) family and society. So, focus on achieving greater marks/grades. Moreover, your future career also depends upon how much you achieved in the finals. If you want to be in the top position or get a good job, you need to score extraordinary grades.

The sad story: several students could not meet the standard, level, or criteria. Because of the immense physical/psychological pressure, despair, and fear of the future and prestige as well as the expectation of the family and society, they ended their lives by committing suicide. Similarly, many students leave the school/formal education without completing it.

Perspective Second in 2025

Scene 1: [Team leader of teachers] I think we are very much successful in terms of supporting students to perform well in the diverse areas of learning. This year, we tried keeping the portfolio of students which I think become useful in tracking the progress of students, identifying the diverse abilities, giving continuous feedback, discovering the weaknesses and strengths of students, and arranging the remedial teaching strategies for the improvement. In this regard, I think we teachers also found it very helpful in terms of figuring out the lacking part or weaknesses in our methodologies of teaching through continuous reflection thereby making significant changes aspiring to bring improvements. Moreover, our collaboration has been the strength to acknowledge/recognize every student, to plan learning activities in a participatory model, and finally enact these plans in the teaching and learning context. Again, there are lots of things to do. I am proposing some alternative forms

of assessments such as performance-based and authentic assessments for the next year. Let's discuss these. To summarize, improving the performance in diverse areas of every learner appears to be the focus of assessment to motivate/encourage them to cultivate creativity, ingenuity, imaginative thinking ability, and critical thinking skills.

Scene 2: [Teacher to Student] You did a splendid job in the last project entitled 'School Gardening'. I liked the way you put your concerns/perspectives in your group, frequently ask questions, and sometimes be the leader of the group to make the project successful. You are very creative. In the last project, I like your idea about planting vegetables that could be beneficial for the public. Sometimes you are worried about your grades. Grades are not everything. The major things that matter in your life are your diverse skills, values, and good character.

Scene 3: [The vacancy of a multinational company] In the competency requirement section, besides academic qualification, they illustrated some eligibilities (life skills) that candidates require. They are: candidates should have

(i) Excellent interpersonal skill with a pleasant personality

(ii) Sound knowledge and skills in advanced technologies (e.g., office, email, internet, etc.)

(iii) Ability to work under pressure and risk

(iv) Strong ability of adaptability and accountability

(v) Ability to think critically and creatively and problem-solving skills, etc.

The story is that assessment in STEAM education is aspiring to enable students to progress continuously in their academic and non-academic life. This is central to learning progress thereby increasing students' engagement and motivation as well as creating coherence between curriculum, instruction, and assessment (Greenstein, 2010).

In the later context, the notion of assessment practices seems to be drastically shifted from giving marks/grades based on the performance of students in high stake final examination (first perspective) to implementing multiple methods such as authentic assessment, performance-based assessment, continuous assessment, etc. to assess the diverse learning areas of students for the improvement of subsequent learning and refinement of the educational practices by conceiving them as an inseparable part of teaching and learning. In 2019, National Curriculum Framework for School Education in Nepal, defined assessment as a process of gathering, interpreting, recording, and analyzing data, using information, and obtaining feedback for replanning educational programs. This is, I think, a narrowly perceived definition of assessment as it seems to be silent to assess and support students' creativity, imagination, and other facets of physical, mental, social, and spiritual development besides intellectual development. In this regard, my vision is to give more emphasis on assessment as/for learning with the minimal focus on the assessment of learning which I think, to some extent, essential.

In the context of STEAM education as an educational approach, it seems to be difficult to collect the information of students' diverse engagement in multiple learning areas or inter/transdisciplinary learning areas such as group activities, project development and execution, involvement in the classroom discourses as well as authentic real-world tasks of problem-solving. In this context, my vision might necessitate some alternative formative methods of assessing students' development and qualitative growth. The authentic assessment seems to be applicable to assess the students' engagement and achievement by respecting the diverse abilities and intelligence of students since this assessment is likely to refer to an assessment in which students are asked to perform real-world tasks that demonstrate meaningful application of essential knowledge and skills (Mueller, 2005; Bagnato, 2007). By involving students in real-world tasks, Mueller argued four reasons why we use authentic

assessments: for direct measures of real-world applications; capturing constructive nature of learning; integrating teaching, learning and assessment; and providing multiple paths to demonstrations. Whilst performing the authentic assessment, the information could be captured from multiple methods such as in/direct observations and recordings, in/formal observations, interviews, rating scales and rubrics, journaling tasks, assignments and presentations, portfolios, surveys, reflections, among many more.

Similarly, assessment for learning is another notion that captures the progress of students which becomes the vehicle for informing them to enhance future learning. In this, the feedback provided by teachers provide students with information about their learning, the gap between current and intended performance, and making significant changes in the subsequent learning practices since feedback is likely to be a key turning point in effective students' learning (Banerjee, 2014, as cited in Pant, 2015). Assessment as learning seems to be valid in STEAM as a pedagogical approach because it might aspire students to become self-directed and self-reflective learners. In this perspective, self- and peer-assessment are likely to be crucial to encourage students to take charge of one's learning by supporting students to develop metacognition. Schoenfeld (1987) describes metacognition in three ways: knowledge about own thought process, self-awareness or self-regulation, and beliefs and intuition. In the same line, Flavell (1976) has discussed metacognition as the ability to think about our own thinking; be consciously aware of ourselves as a problem solver; monitor, plan, and control our mental processing, and accurately judge our level of learning (as cited in McGuire, 2018). Therefore, assessment in STEAM education is providing students opportunities to become independent learners or to become their own teachers.

In the end, my vision of the STEAM education framework in the context of Nepal is likely to embrace more democratic and formative systems of assessing educational practices to guide the developmental process.

The School: Learner's Another Home (World)

Dear Education Minister,

Let me present two contexts. These two contexts arise from my vision towards transformative STEAM-based schools.

Context 1: Both students and teachers are working in activities with a focus on real-world applications of the STEAM curriculum outside the school. They are frequently engaging in outdoor activities such as field visits, community-based projects, workshops, cultural activities, and campaigns. Recently, they did a *'Garden Project'* wherein they collaboratively explored the interdisciplinary knowledge and skills in the school garden thereby researching nature and the relationships among nature, human, and nonhuman beings. The school garden has been the requirement of each school as a part of pedagogical practices. In this regard, school beyond the four walls sounds relevant in the context of Nepal to interact with local people, nature, and all the forms of life. Similarly, it is possible to say that, for students, the whole world as a school is the notion of reformed school.

Context 2: Each classroom inside the school building is a makerspace including modern technologies. Utilization of modern technologies, schools have started the 'Library in Device' program through which students and teachers are able to access resource materials. Tables and chairs have been arranged to conduct group discussions and perform activities. Each classroom is filled with instructional materials through which students are engaged in making and building concrete models. Students can engage in various arts-based learning environments. Schools are providing a wide range of opportunities for students as co-curricular activities (CCA) and extracurricular activities (ECA). Similarly, they are providing continuous programs for spiritual awakening such as yoga and meditation.

> Moreover, a big library, a media hall, an ICT lab, etc. are the other facilities of schools. The school is focusing on inclusive and equitable participation of students in learning.

These are the major characteristics of today's school in my vision which reflect the progressive model to conduct STEAM programs. By accepting the notion of school as a safe place for nurturing the future of students and the future of this world, my emphasis is on making it a favorable place for the holistic development of every learner. By subscribing to the notion of holistic learning, I consider the school as one of the representatives to provide an environment and abundance of opportunities for students and teachers to flourish with diverse knowledge, skills, and good values and attitudes.

The above two characteristics (contexts 1 and 2) are essential for my vision of STEAM learning for cultural identity and innovations. This appears to be useful as STEAM as an educational approach needs such a rich environment or context in order for students to explore the interdisciplinary nature of knowledge and skills and to solve existing problems by integrating the real-world application of STEAM education. The contexts seem to be adaptable to address both local and global perspectives in a balanced manner. In this, I can say that the local heritage and practices could be preserved through educational practices. I am being very hopeful regarding the school characterized by the above two contexts for making a favorable and better future for students and the world.

In my vision, a school is a place for students to furthering their development in diverse areas. For this, providing multiple opportunities of taking part in extracurricular activities is likely to be imperative. This consists of debate, cultural programs, arts-based activities (performative arts, visual arts, linguistic arts, liberal arts education, etc.), and sports activities all connected to integrated learning experiences. By this I mean, these activities in the STEAM learning environment might be connected to curricular activities to make

learning contextualized thereby fostering creative thinking and innovation (DeJarnette, 2018). Such activities are being the major concerns of people for naturally blending mind, body, and soul in the process of learning. The hearts-, minds-, and hands-on activities might be crucial in schools of my vision.

Dear Education Minister, in the requirement of the neo-humanist world, the school needs to have a trustful relationship with parents. In this, the mutual collaborations all to improve children's education appears to be the central focus. But how do we do this? The healthy interactions among parents, students, teachers, and school in all the activities might lead to a realization of interconnectedness. For this, the school can organize meetings to discuss the progress of students; curriculum night programs to review, reflect, and redesign the existing curriculum; and community visit programs so as to make them feel ownership over the school system and entire education. More so, inviting community members to share their experiences in school meetings, parent meetings, and classroom teaching can be helpful to build a strong relationship and maintain academic integrity. While doing so, the people could be accountable in their roles – all are central to quality education. In this, quality and strong leadership are what matters a lot in terms of establishing a conducive balance among people related to school education.

Teacher: A Lifelong Learner

Dear Education Minister,

I hold the view that a great teacher is the one who never stops learning. In the present context, how do you interpret yourself as a schoolteacher? What are the possible attributes of a teacher in your opinion? Here, I have presented two scenarios. The first situation might depict the traditional interpretation of a teacher, which might still exist in the contemporary education system of Nepal. Next, I tried to articulate my interpretation of a teacher concerning my vision of STEAM education.

Situation I: I have got a degree from the university and a license to teach mathematics, science, English, or else. I have learned everything during the 12, 14, or 16 years of my formal education. My only job is to transmit the knowledge and factual information from the textbooks and curriculum to students by controlling students maintaining pin drop silence inside the classroom. I am assigned to finish the course of study on time, deliver the contents, and evaluate students' learning. Students should be responsible regarding their learning, I am not. Students come to the classroom with their memory full of unnecessary and irrelevant ideas and concepts. In this situation, it is almost impossible to add disciplinary knowledge to their minds. So, I frequently say, 'wash your brain' before you enter the classroom. I am superior to them and they must obey what I instruct them. Therefore, my role in education is to teach them, not more than that because I am paid for this.

Situation II: I am a co-constructor, co-creator, and co-planner in the field of learning since humans are interdependent and deeply connected with all life in the universe and part of the same web of life (ecosystem) (Rudge, 2008) and we survive in terms of integrated systems of relationships (Clark, 2001). I am a facilitator in the learning processes. Concerning students' learning, my major job is to help my students to plan learning activities, conduct tasks, assess their learning achievement, and finally encourage them to make outstanding accomplishments. While doing this, I have to be their guardian, sometimes a trustful friend, sometimes a teacher, sometimes a motivator, and all the time their strength to assist them to take risks and convert ideas into actions. Each child is a new curriculum and a very different opportunity for me to learn/understand. I am responsible for their learning and the changes in society.

> I am accountable for the quality and inclusive education. I am a critical thinker and an innovative human being. In this process, I am learning from them and other re/sources. Therefore, I have become a learner again.

These are two very different scenes I have presented here. The first situation might reflect on the role of teachers in the conventional model of education or market or industrial model of education where teaching appears to be a job that might end with teaching the contents. This could represent the unhelpful archaic model of education in the context of Nepal. The second situation perhaps is representing a transformed and empowering vision of education through the role of a teacher. The second situation might provide a wider context of endless, emerging, and diverse roles of teachers in education. Let's talk more about the emergent roles of a teacher in this innovative educational model, I envisage, in the context of Nepal.

The teacher as a problem creator/presenter and solver is likely to be one of the perspectives relevant in the context of STEAM education. Since the major focus of learning through STEAM education is real-life situations and problems, teachers can put incredible effort to bring problems arising from different facets of the world. In this process, a teacher might play a key role to encourage students to bring ill-structured problems may be by interacting with people in the community, or by reflecting upon their experiences, or by exploring on the digital platforms. Jonassen (2004) argues that ill-structured problems are likely to be interdisciplinary, and they may not be solved by applying concepts and principles from a single domain. Pollution, for instance. Next, a teacher might organize tasks so consciously to design and conduct a project that includes the knowledge and skills of multiple disciplines centralizing to a common problem. In the process of doing projects, a teacher might put great effort to motivate students in every aspect of learning to invest students' creativity, imagination, curiosity, and critical thinking to reach out to innovative solutions to

those problems. In this context, the role of a teacher as a creator of problems and designer of activities might be crucial.

Teacher as a researcher is likely to be another metaphor that is present in my vision of STEAM education. I have imagined that teachers are involving in exploring the background and experiences of students which can be the basis to initiate students' further learning experiences. Since experiences are the driving forces of every learning context (Dewey, 1934; Kolb, 1984, 2014), teachers might be motivated to investigate students' 'outside the school life' (socio-economic, cultural, and political). Through an ethnographic research study, students' journal writing of their experiences, and participating in community activities, teachers might be able to learn about every student and their lifeworlds. After doing this, perhaps, teachers are able to bring problems and organize entire teaching and learning activities to foster learning by using the rich experiences of students as powerful means.

My vision of education considers a teacher as a social actor apt for embracing STEAM education as an agenda for social reconstruction. In this regard, STEAM with liberal arts might centralize the problems regarding human life and society at the center of learning wherein students are likely to be engaging in figuring out sustainable solutions. Being a responsible citizen of this society, a teacher can bring social issues such as power imbalance, inequity, inequality, exclusivity, and other illegal issues (stereotypes and deep-rooted inhuman systems) in the academic discourses. Next, I am expecting that teachers can play a key role to mitigate or eradicate such issues by involving students in diverse projects which focuses on campaigns and awareness programs in the community. Such programs might end up finding enduring solutions that appear to be able to place the qualitative and sometimes radical changes in the society that could lead to equity and empowerment, free from any coercive and dogmatic values, beliefs, traditions, etc. Here, I like the idea of Giroux (1994) that the importance of teachers is not only to view them as intellectuals but also to

contextualize their roles in political and normative terms for the concrete societal functions that teachers have responsibilities both to their work and to the dominant society. Considering a teacher as a social justice actor, through an educational experience aimed at developing critical literacies by thinking through critical questions of historical imbalances of power, teachers could be able to engage in dialogue with students that surfaces and challenges particular power structures as they relate to students (Kincheloe et al., 2011).

Teacher as a transformative being is another attribute of my vision of STEAM education that might be a radical perspective coming from transformative adult learning theory in pursuing endless success in education and society. This might aspire to bring perspective transformation in thoughts and actions in the teacher's profession through critical self-reflection on our long-rooted belief systems, hegemonic traditions, predispositions, and status-quo, or frame of references (Mezirow, 1991, 1997; Kitchenham, 2008). The reflective practices might be a tradition for teachers to think about the progressive shift in their actions. In this, the concept of 'how I improve what I am doing' advocated by Whitehead (2008) seems to be crucial to conduct action research studies. I agree with the idea of Schön (1987) in terms of the value of reflective practice as a double loop learning to recognize a reformed paradigm and reframe the ideas for the change. Thus, the reflection-in and reflection-on actions are likely to be crucial practices to embrace to learn from own practices and bring the effective possible change in both thought and actions. Therefore, I value the role of a teacher as a transformative being implementing teaching as a praxis notion in STEAM education to become a change agent.

Teacher as a collaborator is yet another metaphor I would like to discuss here for my vision of education. This seems to be imperative as far as STEAM as a pedagogical approach is concerned. I believe that no one is perfect in all the areas and disciplines regarding STEAM education. This could present the necessary condition of the collaboration of a

teacher of one subject or discipline with others to design lessons and projects and finally execute them in the real-world context. For instance, while conducting the 'Honeybee Project' and solving problems related to a honeybee, teachers of mathematics, science, technology, health, and social study might collaborate. By crossing the boundaries of disciplines or subjects, a unified lesson or project can be designed focusing on a problem-solving approach. For this, various teachers might sit in a place to research, share ideas and concepts, develop learning activities, and finally collaboratively implement them. In so doing, teachers are likely to be able to communicate with diverse knowledge and skills which are required to accomplish learning goals. So, the collaboration among teachers is another thread in my vision of education.

Dear Education Minister, the role of a teacher can be significantly increased in the context of my vision towards STEAM education in Nepal. Now, a teacher is likely to focus on the holistic development of a child which primarily emphasizes on students' physical, intellectual, emotional, and spiritual development. Of these four interconnected areas, emotional and spiritual development seemed to be often neglected by our conventional enterprise of education. Now, you might have experienced that there is widespread consensus of addressing students' emotional development through educational practices such as listening to students' problems, discussing their likes and dislikes, building a friendly relationship, and helping them to express their feelings, etc. learners (management of students' emotional attributes for the learning enhancement) (Shrestha, 2018). In this, my vision of education is aspiring to give the priority to the affective domain in pedagogical practices by developing a trustworthy relationship to help teachers to understand the emotional aspect and emotional intelligence of students (Garner, 2007). On the other hand, since school is providing sufficient space for arts-related activities (as I discussed in the above section), yoga, and meditation, the spiritual dimension can be developed accordingly. Nevertheless, all of the

four dimensions are likely to be interconnected, and my vision towards STEAM education is aspiring to blend them.

As an inseparable part of STEAM education, teachers seem to be capable of using diverse resources to conduct pedagogical practices (several pedagogical approaches governed by the constructivist theory of learning, usage of advanced technologies, etc.). Focusing on the real-world problem-solving nature of learning, in my vision, teachers are the facilitators to provide a favorable environment for learners in order to involve in the tasks and develop higher-level abilities with life skills. During this, they might work for the wellbeing of learners and the world.

Student: A Creator

I am not an empty basket, but a basket with full of surprises!!

Dear Education Minister,

How do you see a student in this 21st century of education? What are the attributes that students should have to live happily in this complex world? Suppose you have your daughter, and she is studying in grade four. In this situation, what are the knowledge/skills, values, and attitudes you want to see in your daughter? When I talk about the past and old-fashioned model of education in Nepal, a student would be viewed as a passive receiver of knowledge as in the banking concept of education (Freire, 2005). The central job of a student would be to absorb what the teacher or textbook instructs, memorize, and sit for the examination. This could picture the pipe pedagogical model placing students at one receiving end. In the present context of the evolution of various constructivist pedagogical approaches, there are some noticeable changes that may help people to change their perception towards viewing students. I have also articulated the roles of students in my vision of transformative STEAM education. Below, I have presented some excerpts to discuss the various/multiple attributes of a student. Let's together delve into this.

Excerpt I: Every learning starts with 'I'. So, my presence in the learning context is crucial. I must be active in the process of learning. I have to utilize my experiences deliberately to construct new meaningful learning experiences. I have to do actions according to my role in the learning activities. The problem-solving process starts with me when I engage in my daily life problems such as managing my stuff in the room, cleaning my utensils, fixing my bags and clothes, helping my parents in household works, among many more. While doing this, I need to learn good values and attitudes so as to adjust in this complex world.

Excerpt II: I should collaborate with my peers while doing tasks and projects. I know my role is very essential in achieving successes because my various roles count in group activities. Peers let me share my ideas and thoughts. In this process, I respect other's diverse opinions and perspectives. I realize the value of group work since एक थुकी सुकी सय थुकी नदि (literally: one spit dries but hundreds can make a river). While doing collaborative work, I need to actively participate in the task(s) and sometimes motivate my group members to engage in the discussion. I have to be a leader sometimes, sometimes a presenter, motivator, and most of the time a contributor. I conceive that learning as a lifelong process that helps us grow with knowledge, skills, and good values and attitudes which are essential to thrive in this complex world. So, collaboration is what we need to solve problems together.

Excerpt III: I should value my and others' cultural heritages. My culture is rich in a plethora of ideas through which I can learn several concepts with viable connections. I can apply those disciplinary concepts in my day to day accomplishments. For example, I could apply the concept of profit and loss while supporting my parents to do our small business of selling vegetables. I could find mathematics, science, social study, language, etc. in my cultures and household activities. So, the

learning processes are giving me opportunities to understand and preserve cultures because this is our identity.

Excerpt IV: I have now become an enquirer by raising questions towards others and myself. I found that questioning is an immense way to explore new concepts and ideas. I become inquisitive all the time. I frequently raise questions regarding the learning contents and processes. Besides this, I raise questions against 'things as they are' that leads me to discover the meaning behind concepts. I understood that I should not take anything for granted. I mostly raise what/how/why questions that have a significant impact on developing authentic knowledge from various sources. Next, involving in projects and discourses related to social, environmental, political issues, I start to raise questions against the unhelpful assumptions, people's inhuman practices, deep-seated beliefs and values, and hegemonic traditions. This I found crucial in terms of advocating justice and freedom for people and our environment.

Excerpt V: Now, I became an independent learner. To become this, personalized learning through various digital platforms and teaching and learning practices that are able to make students their teachers helped me a lot to think about my own learning, study available resources to broaden my areas of interests, and heighten the level of consciousness. Besides formal learning settings, I should learn from other sources by becoming a self-director of learning. For this, my surrounding environment could be an alternative teacher. The incessant development in science and technology is being my inseparable part of learning. By doing this, I am now able to develop this attribute of being independent to become a lifelong and sustainable learner.

Excerpt VI: I am pushing myself in diverse activities happening in the schools. The arts-related activities, sports activities, among other several activities are the facilities for me to explore other skills. I am interested in painting, singing, dancing, and playing football. I love geometry because the figures and objects are mostly linked with shapes while performing dance. I frequently participate in these activities. I feel so connected and energetic whilst involving in arts-integrated learning activities. In doing such activities, learning has become fun, interactive, creative, thought-provoking, and the process of the overall development.

Excerpt VII: I participate in every project work conducted by my teachers which profoundly focuses on outdoor learning activities. During field visits, I am able to communicate with diverse people in the community, with nature, and every essential thing connected with projects (an ecological consciousness). Similarly, the ethical usage of advanced technologies has given the opportunities to develop diverse ICTs skills. By participating in several projects works and field visits, I am able to develop my skills of creativity, critical thinking, communication, and collaboration. These opportunities also provided me to be creative and imaginative to think about a better future. With such platforms, I found myself a responsible citizen of this planet who has several responsibilities to make this world a better place for living.

Excerpt VIII: I am becoming a reflective learner. This started with the learning activities focus on writing autobiographies and journals which seek the reflection upon my thoughts and experiences. Similarly, the practice classroom reflections have been prevalent to become a reflective practitioner by which I could discover my flaws, inabilities, weaknesses as well as my strengths. Later, these became guiding/driving forces for executing an improved version of me. After reflection, I

improved a lot in my thoughts, behaviors, and actions. Therefore, reflection and critical self-reflection are crucial for improving me and my practices.

Excerpt IX: Every situation is a new learning opportunity for me. Examinations and other forms of assessments (homework, assignments, journaling tasks, performances, involvement, etc.) are integral parts of my learning. These appear to be invaluable to get continuous and constructive feedback from teachers which helps me correct and improve myself. Final examinations are likely to be essential to make decisions about my learning journey decided by marks and grades which sometimes might not be good.

The presented anecdotes are the representations of some attributes of a learner based on my framework of STEAM education. In this framework, the role of each student is highly acknowledged because I value the reciprocal relationship between all the other learning contexts and a student. This is a kind of give and take relationship: students input their immense effort to construct authentic learning experiences. These authentic experiences might be the re/sources for students in the next level of learning processes and required for the development of transversal skills to tackle with future endeavors. The aforementioned excerpts seem to be guided by the constructivism theory of learning (including the critical constructivism) as discussed by Vygotsky (1978), Piaget (1970), Ojose (2008), Bentley et al. (2007), and knowledge constitutive interest given by Habermas (1970).

By acknowledging the value of learners in STEAM as an educational approach, they, I envisage, are capable (with diversities and multiple intelligences) of being learner, enquirer, risk-taker, critical and creative thinker, creator, designer, developer, problem solver, and many more. Therefore, a student is not an empty basket, but a basket with full of surprises and full of possibilities. A student might be a beautiful flower that needs a favorable environment (a democratic society) and gardener (facilitator) to continually flourish. S/he

might be a tiny seed of an apple tree which, if the environment favors, could serve thousands of people with apples (achievements). They might need an environment – an auspicious environment.

-----Finally-----

Dear Education Minister,

In this envision of transformative STEAM education, there I see a strong requirement of professional development and authentic teacher education programs to develop human resources (teachers, teacher educators, researchers, and materials) that are likely to fulfill the need of STEAM education. The programs related to more cross-disciplinary knowledge/skills, reflective practice, and profound 21st-century skills might be required. Similarly, the ministry of education can focus on the implementation of the programs and its supervision for quality management. Also, there might be a need of programs for the development of apt infrastructures and providing other facilities for teachers and schools to enact more STEAM education all over Nepal. In the presence of these, my vision of STEAM education might not be successful.

At last, I hope you consider my vision towards making better and multiple futures for the existing and upcoming generations by employing transformative educational practices like STEAM education. With this, I do not mean my vision as an ultimate plan. There are flaws and inabilities of my vision regarding the implementation in the present context of the education system of Nepal. However, this might be one of the alternatives to think and start. I think this letter would become slightly longer. I am very sorry for extending my discussion. If there is anything you need to discuss regarding my vision, I am always there to support because I believe 'together you can bring the change'.

Thank You!

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Reflecting on the Research Question

The focal point of designing this chapter was to address the fourth research question of this inquiry: How have I been envisioning a system of education for pedagogical transformation in the context of Nepal? In responding to this research question, I have developed a vision for the pedagogical transformation that consists of a transformative STEAM education governed by an integrated framework of the curriculum. Delving into the semi-fictive genre of letter writing, I have discussed the vision of the future of curriculum, pedagogy, assessment, school, teacher, and students guided by the notion of STEAM education. I think I am able to address my research question.

CHAPTER VII

MY LEARNING, REFLECTION, AND NO-CONCLUSION

With this chapter, I am concluding my entire journey of conducting this scholarly eminent endeavor which I started with the aspiration of contributing something to the knowledge domain. Yet, I do not take it as a conclusion because I consider research and learning as a continuous process. This research is not only what I produced but also a journey from which I happened to learn abundantly. During this study, I worked as a knowledge seeker rather than a knowledge reproducer. It is certainly a difficult task for me to confine my overall learning in a chapter, but I have tried to portray as much as I can. In the coming sections, I enjoy writing my overall learning and my reflection throughout this inquiry. Moreover, I am presenting my emergent learning throughout this journey of carrying out this research inquiry with the critical reflections on those experiences.

Delving into my Research Journey

I believe that life gives the opportunity to do something new and different from the mainstream, something amazing, and something novel; it is a person's responsibility to turn that opportunity into action and be successful in life. Being a member of an economically underprivileged group, I did not have enough re/sources at hand to begin something new except dreaming big. In the midst of fulfilling fundamental human needs, I made myself strong and did hard work to achieve what I wanted in life. By tackling very weak economic situations, at least my parents understood the meaning of education and they supported me morally and financially to continue my education. The period of my school education was filled with experiences in brick factories and formal academic settings. During this time, I could understand the socio-cultural and economic status of my family. I might have been able

to understand the value of education in human life (education as a means to eradicate all the economic challenges). Thus, I academically achieved more than expected (I stood top in every academic level and grade) that helped me and my family so profoundly to put a smile on our faces and that encouraged me to put extra effort into both education and work. Nevertheless, due to my financial impediments and vulnerabilities, I faced countless hurdles, pains, suffering, predicaments, and very few moments of happiness and joy. Many times, I cried, spitted on my fate, faced hopelessness, and finally tried to stand to fight. Yet, I take human life is all about the mixture of ups and downs.

From the very beginning of my life, I wanted to portray myself as risk-taking, hardworking, and capable of embracing innovative alternatives besides several difficulties. After completing school education, I did not limit myself to the same school and surrounding community, as a result, I went out to explore the wider and diverse community and contexts. That is why, I went to my district headquarter to do my 10+2 and the capital city of Nepal, Kathmandu to do my BEd both in Mathematics education. During these moments, my economic situation forced/encouraged me to work in the multiple non/academic fields that possibly instilled knowledge/skills, values, and characters in me – might be essential to thrive in this complex world. As soon as I completed my BEd, I was extremely unsatisfied with my academic journey which might be under the hegemony of some traditional/conventional practices of education that appeared to be able to shape my identity as a student and teacher to practice overly and/or uncritically emphasized teacher centered as well as factory model of education. I was frustrated and hopeless because of such a mode of education because I seemed to be deprived of essential life-affirming skills.

The next very moment, I decided to switch the university for making something different but meaningful for myself and this education system. So, KU has become another dream come true place for me from where I again started dreaming big. By this, I do not

mean that everything at this university is perfect. I partly do not like some of the normative practices of this university such as its focus on examination, grades, and some disciplinary-based educational practices. However, during two years of journey with KU, while accomplishing my MEd in mathematics education, I achieved a lot regarding philosophical and pragmatic thoughts and ideas that helped me to reflect critically on my and others' (of the wider academic spectrum) unquestioned practices and develop knowledge/skill of constructivist and transformative educational practices that could/can be the empowering possibilities for our education system to bring drastic change. During this journey, I could successfully carry out my research study entitled 'Conceptual and Procedural Knowledge of Students in Mathematics: A Mixed Method Study' (Manandhar, 2018).

After completion of my MEd, I did not stop my transformative learning journey. I started valuing the interdisciplinary nature of research and education. I began to recognize my skill and passion for arts-based activities. I might be able to develop a notion of interconnectedness leading to the integrated nature of learning and education which has largely been neglected by our education system in the name of excelling students in a particular so-called difficult subject thereby preparing them for future STEM-related jobs. In this context, I decided to continue my further university education at Kathmandu University by enrolling in the STEAM education program. This possibly brought me towards becoming a part of an eye-opening as well as transformative dimension of education. In the first semester, I developed my proposal aspiring to do a Participatory Action Research by employing the notion of STEAM education through project-based learning in schools to improve the current pedagogical practices by collaborating with some teacher-researchers (schoolteachers). This was probably my dream project to do something for a community to make some significant but meaningful changes in the practices. I aimed at launching my participatory research by including four other teachers from middle grades in February 2020.

All of a sudden, the COVID-19 pandemic became the villain that enforced me to stop my project because of the worldwide lockdown limiting all of us to the online mode of education. In this context, I could not go out of my room and conduct my research. I waited for the next four/five months, but the situation was still similar, and could not predict how far this goes. At this very moment, I talked with the university officials and my supervisor about the possibilities to start another research study that might be suitable according to the current situation. Having discussed a lot, my supervisor encouraged me to reflect upon my journey as a learner, teacher, research-practitioner, and in later days teacher educator. He encouraged me to dig out my experiences in relation to the education system thereby figuring out the essential issues that could be addressed by a research inquiry. With the tremendous critical self-reflection upon my experiences, I could explore a huge gap between my non-academic worlds or lifeworlds and the formal education system. I started to feel the need of a call for an education system that could address some of the existing issues of education.

I started raising some critical questions in the process of critically reflecting upon our current educational scenarios. *Why is mainstream education not addressing the emerging issues such as students' disinterest, disengagement, and low performance; inability to connect education and life; the negative attitude of people towards education; continuous raise of dropout rates; unemployment due to impractical nature of education? Why are such conventional/traditional models of practices dragging people? Who is being served by such education policies and practices? As a part of this education, why am I not improving what I am doing? Who is/are then responsible? Why is formal education not valuing the lifeworlds of students and others? Why is compartmentalization among subjects and disciplines existing? What could/can be the better alternative(s)?* and many more. Critically analyzing these questions, I started zooming in my experiences from my birth to the present and tried to figure out the connections. By then, I see the huge possibilities of addressing some of these

nerve-racking questions. The series of discussions with my supervisor helped me to seek the broader but meaningful connection of my stories with wider educational perspectives. Hence, this inquiry is a product of my lived experiences arising from my academic and non-academic cultural settings. Moreover, this journey started with aiming at presenting a vision of education that might be crucial for making a better education system.

Writing this inquiry appears to be another physically and psychologically painful and gainful experience for me. I felt tremendous hurdles in selecting narratives from my lived experiences, in analyzing those narratives with the micro as well as macro perspectives aligning with my inquiry, in reading other's scholarly works and bringing their conducive ideas to make my discussion more evident, and in cultivating new, yet creative, idea every time to give justice to this inquiry. In this entire journey, oftentimes I closed my laptop and stopped writing for many days because of not being able to come up with new ideas; I followed the continuous process of erasing, creating, and finalizing words, sentences, paragraphs, and even sections; I spent day and night to write which was another painful experience, and finally, I come to this stage. Coming to this stage with this product, for me, is an excellent gainful experience for me to be proud of myself.

Reflecting on the Research Purpose and Questions

By instilling the value of autoethnography as an emergent and evolving research methodology and following a mainstream research tradition, I aimed, via this inquiry, to bridge my academic and non-academic lifeworlds for envisioning a transformative STEAM education in Nepal. Moreover, I aspired to improve my personal and professional practices as a STEAM educator by critically examining my practices. Developing research purposes and questions to capture this inquiry was probably the most painful experience for me. Creating, erasing, adjusting, and again creating many times and taking the help of my supervisor, I could finalize them. Drawing upon research purposes, I developed one overarching question:

How have I been bridging my academic and non-academic lifeworlds to envision transformative STEAM education? Based on this, I developed four research questions which were finalized after multiple discussions with my supervisor. At first, I started with the first three research questions aiming to capture my selected lived experiences from academic lifeworlds, non-academic pursuits, and my transformative shift. After developing chapters to address all three questions, I came to a stage where I found the whole inquiry is incomplete in terms of searching for a better alternative that could be possible to address the emerging issues portrayed in this inquiry. In this, I encountered my fourth research question which I developed to address my vision towards transformative STEAM education in Nepal. The four research questions were:

- In what ways had my academic journey from school to under graduation shaped my identity as a conventional/traditional learner and teacher?
- In what ways could my non-academic pursuits contribute to my becoming of a learner, teacher, and teacher educator guided by the notion of holistic education?
- In what ways have my Masters' and post-Masters' experiences developed me as potentially a transformative learner, teacher, and teacher educator?
- How have I been envisioning a system of education for pedagogical transformation in the context of Nepal?

The major crux of developing the first research question was to portray my lived experiences throughout this academic journey that shaped my identity as possibly a conventional/traditional student and teacher and this was extremely difficult for me to select some of the major issues related to my inquiry from the ocean of existing educational issues. However, in chapter III, I foregrounded my academic world as an educationally disempowering system of education perhaps governed by Western Modern Worldview (WMW) which is decontextualized, abstract, impersonal, hierarchical, probing-oriented,

piecemeal knowledge and knowing (Taylor & Wallace, 2007, as cited in Luitel, 2009) thereby promoting the one-size-fits-all and reproduction-oriented strategies in all the facets of education. With the thick discussions and critical examination, I tried to generate meanings regarding our practices that are probably guided by the technical human interest which are under the domination and hegemony of un/helpful conventional model of education. Mostly situated in absolute teacher-centric and overemphasized stimulus-response theory or behaviorism-theory-guided approaches, the system does not seem to address the diverse needs, socio-cultural and political contexts, diverse intellectual levels, and multiple intelligence of students. These perhaps gave rise to inequity, inequality, injustice, and oppressed practices in education and society. By saying this I am not against this practice because this might be helpful in the context of learning. However, I am advocating more progressive versions of educating people.

As the heart of this inquiry, I developed the second research question which emphasized on dealing with my non-academic pursuits that were likely to help me and others for being and becoming a holistic learner, teacher, and teacher educator. To respond to second research question of this inquiry (in chapter IV), I presented some selective narratives, dialogues, and stories from my lived experiences from my various non-academic worlds: Brick Factory, Arts-integrated World, Hotels and Restaurants, My World with ICTs, and Entrepreneurial World. I was oftentimes heartbroken and emotional while portraying my hidden and untold stories. Nevertheless, I tried to excavate those painful and gainful stories and presented them via this chapter. I profoundly tried to discuss under each section and subsections that serve the holistic notion of education thereby generating critical awareness to value the integration of lifeworld in the context of learning. All the interpretations in the respective sections called for a contextual and integrative education system that has the potential for the overall development of learners thereby supporting them to be highly

conscious human beings. I tried to discuss how/why to bridge my two separate-like worlds: academic and non-academic by providing sufficient pragmatic and experiential examples from my lifeworld.

Now, there remained a big question about portraying the transformative shift that might be able to establish me as a 'researcher or teacher or teacher educator as a change agent'. The third research question was evolved from my personal and professional contexts experienced as a teacher, teacher educator, and research-practitioner during the time of my MEd in mathematics education and MPhil in STEAM education. Under several section sections (in chapter V), I wanted to convey my transformative move by embracing the cultural contextualization of curriculum and educational practices, ethically sound ICT-integrated learning, Arts-based pedagogies, and several progressive pedagogies that might enable people (students, teachers, parents, experts, and other stakeholders) to drastically improve the ongoing practices thereby solving the most pressing problems that are faced by the whole world. Moreover, I developed this chapter to search for the connection between my academic and non-academic world. Throughout this chapter, I found that we need the major and meaningful change in our current educational practices by balancing the old and new versions of thoughts, ideas, and actions to embrace empowering vision i.e., STEAM education for the future.

Finally, I extremely needed to develop a pragmatic, yet transformative STEAM education if we want to respond to the existing issues faced by our educational practices and the whole world. It was also necessary to fulfill my research aim for creatively thinking about a system of education since I take transformative research as/for envisioning a better world through this journey became most challenging but motivating for me because of the effort of creative imagination I used in developing the vision. To address the issues of sustainability and several other issues, I developed a transformative vision of STEAM education in chapter

VI. Enjoying in a semi-fictive letter writing genre, I wrote a letter to the Education Minister of Nepal by illustrating the nature of education in the past, the present scenario, and by profoundly discussing my vision towards a better future. Under the inter/transdisciplinary integrated nature of the curriculum and curricular practices, I developed my vision. With the help of generated sections: *STEAM as Educational Approach, The Assessment: Let me Help Improve Learning, The School: Learner's Another Home (world), Teacher: A Lifelong Learner, Student: A Creator,* my vision, I consider, is my noble but ideal in terms of creating innovative, empowering, and inclusive education system in the context of Nepal.

Reflecting upon my Theoretical Referents

When it comes to using a theory or theories in research, I always remember a quote of my supervisor i.e., *'when you do not choose a theory, theory chooses you'*. By this I mean, there is probably nothing that is not guided by one or more theories. When I say, 'I do not use theory'; I am here governed by a particular philosophical perspective or orientation. In this regard, to minimize the domination of a particular theory in my interpretation and meaning-making process throughout this inquiry but discussing ideas from the reference point, I have used theories as referents. Therefore, I selected three theories as referents in this inquiry. They were Living Educational Theory (Whitehead, 1989, 2008), Transformative Learning Theory (Mezirow, 1991), and Knowledge Constitutive Interest (Habermas, 1972). I am here to discuss how I used these theories as referents in my inquiry.

In the context of a newer but better version of 'I', I have always centralized to a question: *How do I improve what I am doing?* This might become useful to reflect upon my previously held beliefs and practices thereby providing me a sufficient space to improve. The major agenda of this research inquiry was to improve my own personal and professional practices by re/examining my long-situated values, beliefs, and existing practices embedded in my academic and non-academic lifeworlds. This is aligned with Living Educational

Theory as it is an explanation developed by an individual for his/her educational influence in his/her learning, in the learning of others, and in the learning of the social formation in which he/she lives and works (Whitehead, 2008, as cited in Pant, 2015). This is the case that there is always a room for improvement in every practice, but it is an individual's job to put effort to bring meaningful change. In this entire inquiry, I presented my lived stories and narratives from my personal and professional contexts (focusing on my non/academic lifeworlds). I tried to demonstrate 'I' in every narrative concerning my culture (Chang, 2008) I presented thereby welcoming readers to reflect upon their own stories. While doing so, I tried to show the significance of 'I' as a living contradiction throughout the narratives in this inquiry.

This journey is one of the products of my continuous critical self-reflection upon my taken-for-granted frames of reference. Before my entry in Kathmandu University, I persuaded the educational practices and my practices in my lifeworlds without questioning or assuming these were taken for granted. At that time, I was not so much conscious about my actions and the negative/positive aspects of those performed actions, I just followed what others were doing. In my master's and MPhil journey made me critically reflect upon my beliefs, values, assumptions, and predispositions thereby helping me to move ahead with more inclusive and empowering practices. This is aligned with the Transformative Learning theory rooted in the work of Jack Mezirow (1991, 1997) in the area of the adult learning setting. In this inquiry, I presented my lived stories, narratives, and dialogues and assessed them with the critical vantage points. By doing this, I explored the possible better alternatives. In this entire process, I critically reflected upon my values and beliefs system to make them more 'inclusive, discriminating, open, reflective, and emotionally able to change' (Cranton, 2016, p. 27).

I used five ways of knowing as illustrated by Taylor (2015) such as cultural self-knowing, relational knowing, critical knowing, visionary and ethical knowing, and knowing

in action. Starting this inquiry with criticalism, critical knowing helped me to critically examine the power structures embedded in our practices (my academic lifeworld) that might be capable of conducting the ways of being and becoming 'as they are'. In each chapter, with the various narratives I presented, I tried to envisage a better alternative with the heightened consciousness for our educational practices focusing on curriculum, pedagogy, and assessment. In this, the visionary knowing helped me to make an inclusive vision of education (contextualization, integrated learning and curriculum, and vision for STEAM education). The relational knowing helped me understand what things make me different from others and what connect myself relationally with others. Similarly, the interpretive paradigm gave me a sufficient space for cultural self-knowing by making a broader sense of myself as a person in relation to my culture. This was possible through the critical self/reflection upon my values and beliefs grounded in cultural practices. In the presented narratives and associated in-depth discussions, I tried to become consciously aware of what/how I can make difference in my current actions to perform more inclusive and empowering practices. In this way, I have reconstructed my new self thereby integrating empowering worldviews into my deep-seated and cherished worldviews. This new self might have fueled with transformative capabilities to practice transformative praxis through action and critical reflections helping me to transform my ways of being/becoming, ways of knowing, and ways of valuing. So far, the transformative journey, for me, was not linear, as predicted, and one-size-fits-all; rather it was a multi-pronged, multi-dimensional, and multi-paradigmatic process (Luitel & Taylor, 2019). In this interconnected and interdependent world, I believe that this transformative journey might not only change myself but also others.

Habermas' knowledge constitutive interest in another theoretical referent in my inquiry. I have taken three forms of knowledge constitutive interests as developed by

Habermas (1972) and his followers and they are technical, practical, and emancipatory interests.

Technical rationality, I think, might be grounded in human thoughts and actions because we might be functioned to think and act objectively. We seem to function as per the instrumental (cause-effect) and technical rationality (fixed figures, definitions, rules, algorithms) because these might be foundational for most of us to perceive reality, construct knowledge, and value the world. When it comes to education as the process of reproduction, it might be true that our conventional model of the education system seems to be guided by this normative-empirical analytic science. In this inquiry, I have presented narratives, stories, and dialogues that might articulate the context of our education and my (our) perceptions as well as actions towards those practices governed by empirically grounded laws (Grundy, 1987). In this case, the technical interest was helpful, as a reference point, in my research.

One of the ideas I value is the power of interaction between/among people and people with phenomena to construct a viable knowledge by being people 'in here' or together. The collaborative interactions in socio-cultural settings in the communicative space are what matters to de/construct knowledge and reality. This is associated with Habermas' practical interest. Hua (2015) discusses, "Practical interest transcends dualism and controlling character of technical rationality and constructs a new relationship between human beings and the world—an intersubjective relationality through human understanding and interaction with the world" (p. 57). In this entire inquiry, I have presented stories, dialogues, and narratives that might constitute other people and most importantly the situated phenomenon. By employing writing as an inquiry, I have presented the multiple opinions/perspectives in each discussion and come to a viable perspective with in-depth analysis. Practical interest helped me to understand the power of interaction with people and the world (phenomenon) to better make the sense of different voices in the data text.

Emancipatory interest is the third knowledge constitutive interest I have used as a referent in this inquiry. In the later part of my academic journey, I tried to be aware of various disempowering forces embedded in my personal and professional life by critically reflecting upon the unquestioned assumptions that were likely to be constraints for my and others' empowerment. I tried to make conscious efforts to be aware of various false consciousness held in the practices of my academic and non-academic lifeworlds. This might serve me to emancipate myself and help other people to provide sufficient space for raising questions thereby recognizing and acknowledging all the voices to practice freedom and autonomy. Throughout my discussion of narratives, I presented in this inquiry, I tried to critically reflect upon every perspective and make meaning that might empower me to raise the critical question by liberating from all sorts of taken for granted assumptions regarding my personal and professional life.

Looking Back to Multi-paradigmatic Research and Evocative Autoethnography

I began this journey with the primary motto of unfolding my untold hidden stories and experiences that emerged from my cultural backgrounds. My deeper but meaningful exploration regarding my academic and non-academic worlds by interconnecting the wider spectrum of education for envisioning a better world is what/how I come to this stage. Employing three leading theories: Living Educational Theory, Transformative Learning Theory, and Knowledge Constitutive Interests and three crucial concepts such as holistic education, research as transformative learning, and research as envisioning as referents I have crafted the entire research by situating in three broad qualitative research paradigms: criticalism, postmodernism, and interpretivism under multi-paradigmatic research design space.

Since this inquiry started with raising critical questions against the existing practices of education with the help of critical self-reflection upon my values, beliefs, assumptions, this

inquiry took the first step. By this I mean, the research started with the critical analysis of my lived experiences and finding the gap. Therefore, I was firstly governed by the criticalism paradigm of research. Criticalism provided me enough spaces to craft my research with the critiques on the educationally disempowering and culturally decontextualized nature of education as well as to unfold my in/visible taken-for-granted assumptions that are constraining for making improvement in my personal and professional lifeworlds. To support the criticalism and my transformative professional development, I needed to express my painful and gainful experiences through multiple forms of expressions to make them alive so that you (readers) could make the contextual meaning through mind and heart. In this regard, I used the postmodernism research paradigm to express data text through arts-based genres such as narratives, stories, pictures, paintings, etc. Here, I used multiple logics and genres such as dialectical, metaphorical, narrative, non-linguistic logics and genres. These helped me to make my data text more evocative, crystal, and meaningful. Moreover, interpretivism helped me to generate context-based understanding. This supported me to understand myself and others (my culture(s)) by raising questions such as who am I? What is my position in my culture? This enabled me to explore my lived experiences thereby making the meanings with contextual interpretation.

Reflecting on Evocative Autoethnography

At the very beginning of my interaction with various methods of conducting research, I was in a dilemma about which method is likely to be the best fit as per the nature of my inquiry. In this regard, the traditional research often seems to adhere to hegemonically masculine traits, focuses on objectivity, control, and predictability thereby shadowing humanity, subjectivity, emotions, and feelings because the researcher is mostly guided by hegemonic rules and dogmatic beliefs and practices of doing research (Adams et al., 2016). With this understanding, the traditional nature of the research method (e.g., survey) would be

insufficient or did not capture the agenda of my research. So, I wanted a profound research method that would be capable of addressing my subjectivity of the knowledge construction, uncertainty, my emotional voices emerged from my academic and non-academic worlds, and personal traits. In this context, I encountered evocative autoethnography. Bochner and Ellis argued that:

> Autoethnography brought heightened attention to human suffering, injustice, trauma, subjectivity, feelings and loss; encouraged the development of reflexive and creative methodologies through which to navigate the landscape of lived experiences; and legitimated unconventional forms of documenting and expressing personal experience in literary, lyrical, poetic, and performative ways. (2016, p. 45)

Therefore, I chose autoethnography as a method to carry out this research inquiry since this might be a response to oppressive, colonialist, and inhumane research practices, and from the recognition that human difference matters (Adams & Ellis, 2012). I tried to portray my lived experiences through multiple forms/genres of writing such as stories, dialogues, pictures, etc.

As an autoethnographer, I worked to provide dense descriptions of my lived experiences with the multiple cultures I lived in order to better understand my cultures and my experience in it (Adams & Ellis, 2012). By supporting this argument, I tried to unfold my lived experiences filled with painful and gainful attributes that emerged/evolved from my involvement in several cultures: my academic and non-academic lifeworlds. I tried to provide a thick discussion so that I could better represent my experiences.

Autoethnography is both process and product – way of doing and representing research (Ellis, 2004). As a process, I was involved in putting every possible effort to depict my lived experiences through evocative ways of writing and presenting, to make meaning from them, and finally tried to come up with a better alternative. As a product, I come up

with this new construct which becomes my asset aspiring to contribute something to this knowledge community and research area.

Finally, I agree with Adams and Ellis (2012) regarding the benefits of autoethnographic research which includes '(1) its therapeutic possibilities, that is, its ability to help authors, research participants, and audience members transform their lives; and (2) its valuing of relational ethics – the interpersonal ties and responsibilities researchers have to those they study' (p. 189). During this inquiry, I learned so much by critically reflecting upon my lived experiences and my values and beliefs attached to these experiences. By portraying them through this research, I am confident that I developed a conscious awareness to value myself, my culture, and my accountability to transform to make a better place for living, being, and becoming. That is why my vision of transformative STEAM education (chapter VI) could be one of my ideal visions I developed via this journey.

Me at Present

This journey has been a worthwhile expedition for me that helped me learn so much and it fills me with pride to be able to contribute something to the knowledge community. My learning journey of MPhil in STEAM education turned out to be one of my assets to bring significant and meaningful changes in my personal and professional contexts thereby encouraging people for better improvement. Additionally, this inquiry has been my endeavor wherein I put my efforts in every way possible to come to this stage.

During this journey, I learned the power of critical self-reflection that helped me to become a reflective practitioner with emancipatory sensibilities in both my personal and professional practices. This made me someone who does not take anything for granted but analyzes through critical lenses and accepts if it is 'good' for me and others. Moreover, this is likely to inculcate me to stand and help people fight against disempowering and unjust practices and assumptions thereby aspiring to make this world a better place for being and

becoming. In doing this, I have developed a sense of 'doing a good deed' for humanity and the world with maximum ecological consciousness by developing good values, characters, and knowledge/skills. Therefore, this journey made me a powerful, conscious, and accountable person. This encouraged me to do transformative actions in the field of education and my personal life.

My MPhil in STEAM education and this research journey taught me a lot for envisioning a better world for existing and upcoming generations. In this, I am proud that I could make my transformative vision for STEAM education that seems to be crucial for changing this world for embracing better alternatives for curriculum, pedagogies, and assessment. By doing this, I have become a more creatively imaginative and critically conscious being. At present, I have become a change maker or change agent who thinks and acts to bring effective, inclusive, and innovative changes. This does not seem only for the present but for the future(s) too.

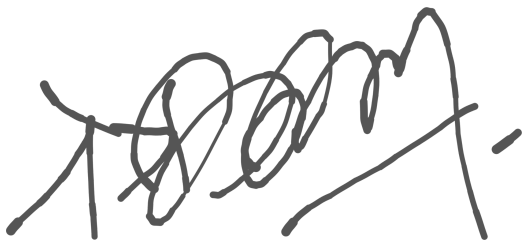
My Upcoming Future Direction: Yet No-Conclusion

At the point of this research inquiry, I have perceived transformative educational research as a process of contributing to the knowledge domain with the intent of working on embracing more inclusive and empowering educational practices. So, I have envisioned a transformative researcher as a change agent who has knowledge, skills, and ethical values to improve what s/he is doing. I believe that the first step of change starts with 'I'. Next, collaboration among people is crucial for bringing a drastic change in any workplace. In this regard, this research inquiry is my first step to bring that change in my personal and professional contexts thereby encouraging other people to join this transformative movement.

My vision (chapter VI) could be the initial phase to advocate a transformative STEAM education in Nepal which I consider a breakthrough to shift the contemporary and disempowering educational practices in all the facets of education. Even in the policy

building process, there should be an intense need of transformative sensibilities to include the vision I envisioned. In this regard, I believe that education should provide a favorable environment for a child/learner so that they can connect life and the world by solving authentic problems arising from all the areas of this world. Yet, this is not the final or ultimate option to improve our educational practices. For me, however, I take it as a significant step to move further. I do not consider this research inquiry as a conclusion but as a continuation of my motto of contributing something to the transformative movement of education. I have countless responsibilities to perform as an educator and a research-practitioner in the field of education. Therefore, I have dreamed of and made plans of doing extraordinary things in the days to come.

Supporting my vision of transformative STEAM education, I would like to conduct a Participatory Action Research (PAR) under transformative STEAM education if I get a chance to do my PhD because, I believe, together we all can bring the changes.



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