


Doing, Teaching, Learning and Thinking About Mathematics – On Becoming a Transformative Teacher

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Abstract

I solved many mathematical problems till today - countless academic problems inside the classroom, and a few pragmatic problems outside. At the beginning of my teaching career, I spent significant time convincing my students that mathematics teaching is an algorithmic problem solving of routine mathematical items to get the correct answers. Afterwards, I slowly took a shift from doing mathematics to teaching mathematics, identifying lots of tricks, tips and techniques. I spent more than a decade to train myself with better techniques to become a better mathematics teacher seeking better achievements of students in written tests. Later on, I engaged myself as a math learner and sought the significance of the methods I employed to teach the mathematical concepts, relation, and logics. I am now at the crossroads of searching better alternatives that help students learn mathematics in a meaningful way. I frequently ask myself why I am teaching mathematics. What does a good mathematics teacher mean? What we do is largely guided by what we believe. Questioning on the widely accepted assumptions, examining the deep-rooted beliefs for the positive shift, and highlighting the epiphanies of my professional life could be very essential on becoming a transformative teacher. In this paper, I portray my narratives as a student and as a mathematics teacher to explain my shift towards becoming a transformative teacher. Through my verisimilitude narratives, I invite readers to examine their beliefs and practices on teaching mathematics, and envisage for better alternatives being aware of their limitations and contexts.

Keywords: Critical-self-reflection; Transformative Learning Theory; Beliefs; Practices; Storytelling

Who Am I, and What Did I Do?

I am working as a mathematics educator in one of the universities in Nepal. I spent more than a decade as a school level mathematics teacher. During that time, I experienced various modes in teaching and learning approaches. When I was a post graduate student in the university, I employed multi-paradigmatic research approach (Taylor, Taylor, & Luitel,

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2012), and critical auto-ethnography as a research methodology during my research work to critically reflect on my own beliefs and practices about mathematics teaching and learning, aimed at improving my practices as a teacher educator by envisioning better alternatives. I have been using autoethnography as a transformative research method (Custer, 2014) in my professional life that allows me to change myself by examining the disabling forces embedded within me and my surroundings in relation to mathematics teaching and learning. In this context, I portray my narratives through the lens of Transformative Learning Theory (Mezirow, 1991) as the process of effecting change in a frame of reference. As Mezirow (1991), I believe that transformations involve both changes in meaning schemes (beliefs, biases, feelings, attitudes and knowledge) and changes in meaning perspectives of reference frames (integrated set of meaning schemes, assumptions and expectations) through which individuals filter their experiences.

In this paper, I use narratives/stories as a means of capturing and studying my beliefs and practices. I believe that stories could provide meaningful opportunities to allow me to capture the lived experiences of mathematics pedagogy, to explore thinking about teaching mathematics, and to get the meanings and alternative perspectives that could influence my behaviours and practices in a constructive way. As Connelly and Clandinin (1990) mentioned “Humans are story telling organisms who, individually and socially, lead storied lives” (p. 2); for me, the study of narrative is the study of the way humans experience the world. I have thus used narratives as a variously described method, as the result of a method, as a way of making sense of life, and as a phenomenon (Bochner, 2014; Clandinin & Connelly, 2000).

“Memorise Them! Prove Yourself ‘Genius’.”

When I was a student at the secondary level, there was an option to choose between mathematics and history as an optional subject. In those days, I would hear horrible myths about studying additional mathematics. It was believed that only the talented students (i.e. high scorers in the previous grades) could take mathematics as an optional subject. Many of us were interested in additional mathematics, but we needed to prove that we were talented.

It was a day of February 1997, my first day in grade nine. We all were in a happy mood. A dark and tall teacher entered the classroom. He said,

“I am the teacher of additional mathematics. It is a very difficult subject. I came to know that many of you are interested in taking mathematics for an optional subject. There are many formulas. You need to memorise them all. If you are able to reproduce them tomorrow, I will let you take mathematics for an optional subject. Otherwise, you need to join another group - History.”

He started writing symbols and formulas on the board, and commanded us to copy. It was the first time in my life that I saw those symbols. The teacher just told us how to

pronounce and recite them. I was so frightened that day. I needed to prove myself as one of the brightest students in the eye of the teacher to study the additional mathematics.

I could not make any sense about the trigonometric relations on that day. My primary concern was to recall those all trigonometric relations by the next day. It was not an easy task. The teacher sometimes used to give us the ready-made techniques to memorise the formulas. For example, the teacher wrote;

$$\text{SinA} = p/h, \text{CosA} = b/h, \text{TanA} = p/b$$

The teacher gave the techniques to remember this trigonometric relation in this way:

“Pandit Badri Prasad Hara Hara Bole”

Each initial alphabet of the above slogan P, B, P, H, H, B represents the alphabets of three trigonometric ratios in order from numerator to denominator. But, we were unlucky as we could not get any ideas to remember other formula on that day. When I reached home from school, I started to recite the formulas in a loud voice. I was permitted to prove myself as a capable candidate for additional mathematics. I went to bed at midnight after I memorised all the formulas. The next day, the teacher asked us to write the formulas on the board one by one. We all tried our best. Many of my friends could not reproduce them. As a result, they went for another subject - “History”. “Thank God!” I could remember and write the formulas on the board. I proved myself as a “bright student” for the teacher. I felt as if I reached the top of Mount Everest. I still remember the teacher’s statement on that day. He said, “Mathematics is only for the bright students. You need to memorise all the facts and mathematical relations to solve the given problems in a limited time.”

The mathematics teacher was presenting mathematics as a collection of facts that should be memorised without any questions. Later, I came to know that it was the absolutist view (Ernest, 1991) of mathematics. The absolutist view of mathematical knowledge is that it consists of certain and unchallengeable truths. According to this view, mathematical knowledge is made up of absolute truths, and represents the unique realm of certain knowledge, apart from logic and statements true by virtue of the meanings of terms (Ernest, 1991). During the time, we, as students, developed the belief that mathematical knowledge can be understood in a single way. The way is to memorise facts and practice the same routine problems recurrently. While describing the traditional view of mathematics, Lerman (1990) mentioned that mathematics is a subject that is seen by most of the people and by most of the practicing mathematicians as the paradigm of knowledge - certain, absolute, value-free and abstract, which is similar with the view of Plato that normally makes mathematics irrelevant in terms of its study and its development.

The above view was very pertinent in the context where I grew up. Many of the mathematics teachers were not exactly “mathematics teachers” in the school level. Some of them were college students who value procedural knowledge, routine-based problem without any pedagogical orientation. A study report by the Department of Education (2012)

showed that one of the most serious problems is the lack of subject teachers. Even today, it is difficult to get mathematics teachers in the school level who have specialisation in mathematics. On the other hand, I realised that, those who have specialised in mathematics are found to be more algorithmic problem solver rather than conceptual meaning developer.

I continued developing questions on mathematics and mathematics teaching. The initial moment of being a student of additional mathematics was very challenging for me in the sense that it was supposedly made to be tough. Due to the lack of culture of sharing problems with teachers, I had many questions within myself. Is mathematics a series of new symbols and relationship? Is mathematics only for the (so-called) bright students? Is learning mathematics mere memorising and problem solving within a span of time? Can't we question on the existing mathematical knowledge? Is mathematical knowledge always true? These questions remained unanswered for me. They were always in my mind when I was a secondary level mathematics student.

I Can Solve Mathematical Problems! I Am a Good Mathematics Teacher!

It could be any day in June, 1998. This was the time when I was enjoying a lot after appearing my SLC examination (This was a national level examination in Nepal taken at the end of tenth grade till 2015. The full form of SLC is School Leaving Certificate). There was no homework, no any preparation for examinations, no need to spend nights memorising the notes. On the other hand, I was busy with household jobs. I was confident that I secured good grades in the SLC exam.

One day, a group of my neighbours came to my house. I was working on the field nearby. One of the persons asked my father, "Our sons and daughters are weak in mathematics. They are now in grade ten. Your son always stood first in school. Everybody praises that he is very good at mathematics. We are here to request your son to teach our kids." Another person said, "The school is far and our kids cannot go to Big Master's (the teacher who teaches mathematics in school) house. We pay for the tuition. We beg your help. If our kids fail in the SLC, their future will be dark."

"He has just appeared for the SLC. He has not passed it. How can he teach Mathematics? It is not an easy task," My father said. I was observing these conversations from the nearby field. My father immediately said, "You please talk to him. If he is ready to help, it is okay. I have no objections." "Binod, come and talk," My father called me.

I immediately went to my house. I acted as if I did not listen to their conversation. I remained silent. One of my well-known neighbours said, "Small Master, my Bhunte secured ten marks (out of one hundred) in the previous test. Now, please help our kids."

I was confused. How do I respond at that moment? I thought I could teach because I could solve almost all the problems given in the textbook. At the same time, I thought I could not teach because I did not have any experience of teaching. Another neighbour

distracted my silence, “We do not know anything. We send our kids to your house from today in the evening. Help them to pass in Mathematics.”

“I will try my best to help my sisters and brothers.” I showed my acceptance. I was happy that the neighbours trusted me. I was also sad thinking how they would take me if I could not satisfy them with my teaching.

On the next day, five of my juniors came to my house with some books and notebooks. I was familiar with them as my juniors in the school and as my neighbouring friends in the village. We all sat on a mat. I was at the centre.

I asked, “Which problems are not solved? Please ask me. I will solve the problems and get the answers.”

Binod brother, “I do not know how to solve the problems of Unitary Method.”

“I do not understand what geometric proofs are?”

“I hate trigonometric identities. They cannot be proven although I give them sufficient time. I cannot remember the particular techniques for particular problems”.

My friends raised many questions. I was expecting their particular questions but they were asking me as if I could help them make mathematics easier. I was at the state of dilemma. What to do? How to start? Whom to listen? I, then, immediately asked for a book. I decided to help them with the unitary method. This chapter was/is regarded as one of the most difficult portions. Our teacher also could not solve many problems in this chapter. In some cases, the teacher used to say that the answers were wrong and sometimes he used to convince us saying that some particular questions were not important for the examination. But, we understood that our teacher did not know how to solve those problems. We would see whether our teacher could get the correct answers rather than trying to make sense of those problems.

I wanted to give good impression among my friends showing that I could solve the mathematical problems. I knew that they were not satisfied with their mathematics teachers and they were themselves ‘weak’ in mathematics. This was a good opportunity for me to make my space, I thought. I asked one of the students to give his notebook. I copied one ‘important problem’ from the book highlighting that it was a frequently asked question in the exam. My friends paid attention, and they were ready to copy the solution. I solved the problem. I was confident with my solution. But I knew my friends did not believe until they matched the calculated answer with the textbook’s answer. “The answer matches with the textbook,” Bhunte said. I allowed a few minutes to copy the solution. All of them copied each line of the solution. I immediately chose another similar question from the book and asked them to solve. My friends followed the same procedure, changed the names and numerals, and finally got the answer. They checked the answer. They got the correct answer. They were happy.

I continued the same approach for about two months. I solved many problems posed in the textbooks, made students practise on similar problems and helped them memorise the process of the problemsolving in many cases. I felt that my friends were happy with the way I ‘taught’ them. The hidden story was that I used to solve the problems alone before my friends would come to my house. I would sit with them with full of confidence after getting the correct answers. This was the way I started teaching mathematics. I thought I was a good mathematics teacher at that time.

When I reflect back on those days, I get stunned. A number of questions come to my mind. What sort of beliefs did I hold regarding mathematics teaching? Why did I develop such disempowering beliefs about mathematics teaching? Why did my friends seem satisfied with my ways of teaching? Why did I celebrate such algorithmic ways of problem solving as the only approach in mathematics teaching? What were the hegemonic forces that could not allow me to think of some alternatives perspectives on mathematics pedagogies?

One of the major reasons could be the culture of examination process that exist in our context. Everybody was expecting a very good mark in mathematics in the SLC examination, and it was determined only by a three-hour written test. Such examination culture promoted the algorithmic ways of routine problem solving that frequently appear in the examination. On the other hand, my beliefs towards mathematics is that, mathematical knowledge is made abstract by avoiding lived, felt and experienced realities associated with its process of knowledge construction (Hersh, 2006). The deep-seated beliefs towards the absolutist nature of mathematics shaped me to act this way: teaching as the transmission of knowledge. This entailed a belief in the importance of a collection of procedures or routines, particularly about paper and pencil methods, one for doing each particular type of calculation regardless of whether or not a different method would be more efficient in a particular case (Gates, 2001, p. 115). In this approach, students are taken as the empty vessels and teachers are the masters of knowledge.

There is a famous saying that ‘we teach our students as we were taught by our teachers’. I was taught in the same fashion that ‘mathematical teaching is all about algorithmic problem solving’. I did not blame my mathematics teacher about the ways of his teaching though I was not satisfied with his inadequate preparation to solve the problems in the textbooks, and get the correct answers. I thought I was good because I gave enough time to practise the problems and to memorise the algorithms.

Now, I feel that I was overwhelmed by various disempowering beliefs about the teaching approach. Actually, I was grown up with a host of not-so-helpful pedagogies as transmissionist, reproductionist, hierarchical and elitist (Luitel, 2009). For a transmission-oriented teacher, if the teacher has explained a method clearly and logically, then any failure to learn must be the result of the student’s inability rather than a consequence of the teaching (Gates, 2001, p. 115). So, I celebrated as a good teacher at that moment.

The reproductionist view promotes the replication of the same culture assuming that cultural is an unchanging structure separated from individuals. This shows we are guided by a worldview which Taylor (2006) terms “Western Modern Worldview”. The Western Modern Worldview-guided curricula and education models upon their colonies have disoriented mathematics and science education in many Asian and African countries. We are reproducing the so-called mathematical ideas borrowed from the western countries. On the other hand, why did I and our teachers not use local practices in mathematics teaching? In this regard, perhaps, we, with the neo-colonized mindset, could not be able to develop critical perspectives at that time.

The other disempowering force was the practices of hierarchy among teachers and students. The teachers were taken as the ultimate sources of knowledge as Plato argued. We, as students, could/should not raise the questions that are not pleasant to the teacher. We were habituated not to ask off-track questions, their applications and against the standard procedures. Perhaps, we were extrinsically motivated for the higher grades in mathematics being a good listener in mathematics class and maintaining the hierarchy with teachers.

I was lately aware about the nature of mathematics as an elitist subject which is disempowering forces in mathematics pedagogy. School mathematics is traditionally perceived as an elitist subject for more academically oriented learners (Namukasa, 2004). Many of my friends from so-called backward and minority communities would say that mathematics is only for Brahmin and exceptionally bright students from other communities. They had deep-seated beliefs that they, as backward community members, did not have ability to learn mathematics and they were made to learn lower level skills. In this context, Skovsmose (1990) also argued that school mathematics has political implications as it favours certain groups of students, stratifies society, and serves as an introduction to an ideology characterized by certainty, idealism, and rationalism.

“Please, Sir! Give Us the Best Techniques of Teaching.”

It could be any day of March, 2012. I was teaching at one of the reputed private colleges as a full-time faculty, and at New Age University as a visiting faculty. I was involved with some publishers to develop reference books for school mathematics. I sometimes got opportunity to deliver teacher training sessions at different organizations. One of the publishing houses arranged a training session for secondary level mathematics teachers at the north outskirts of Kathmandu Valley. The hidden purpose was to advertise our recently published “Mathematics Practice Book” among the mathematics teachers. I purposefully selected the theme, “Effective Ways of Teaching Mathematics” to make it appealing so that a huge mass could be gathered.

It was about 10 am. I entered the hall. The multi-media was ready. A bundle of “practice books” was at the front. The hall was full of teachers. Many of the teachers seemed novice. I knew forty teachers were in the hall. The organiser broke the silence of the hall with my

introduction. “Mr. Trainer teaches at the university and some colleges. He has presented papers in some of the national and international conferences. He is also a book writer. You will get the books written by him after some time. I, now, request Mr. Trainer to deliver the session.” One of the organisers introduced me. I was confused whether he introduced me or the recently published practice book.

Anyway, I began my job. Though I put “Effective Ways of Teaching Mathematics” as the theme of the training, my intention was to discuss something else. At that time, I was convinced that there were no absolute ways of teaching mathematics which could be named as effective methods. I was searching a convincing approach to get into my deliberate topic. I made four groups and assigned them with the task to discuss and share their beliefs about the effective ways of teaching school mathematics. Initially, they seemed confused. Perhaps, they were expecting my lectures on the topic and some useful skills that could be easily applied in the classroom teaching.

“You all are in-service teachers. You have experiences of teaching in schools. Please discuss the effective methods that you felt. I will share my thoughts later.” I encouraged each group members to participate in the discussion.

After a few minutes, they seemed ready to share their group discussion.

One of the teachers representing the first group started sharing.

Sir, we all know that mathematics is a difficult subject. We should give students lots of techniques to memorise the formula and steps of some important problems. There should be many tricks and ways to teach mathematics. One cannot learn mathematics till s/he practices regularly. We think that the best way is to teach how to make students practice. We are struggling hard to teach secondary level mathematics. Most of us are the beginners for secondary level school mathematics. The students ask how to prove geometric theorems, how to memorise the formula in trigonometry, how to remember the tricks and techniques of proving trigonometric identities, how to give concept on vectors and functions?

Sir, you have long experiences in this field. You are a book writer, and a teacher trainer. We are here to listen about the best techniques of teaching so that we can apply them in our classrooms. Please, give us the best techniques.

I asked other groups to share their beliefs on the effective ways of teaching. The rest of the groups shared similar beliefs. I did not find any beliefs from other perspectives rather than searching the tips and tricks. I came to know that almost all of them were searching for the best techniques, which could be given by the trainers/experts. Those techniques could be easily taken by the teachers, and be applied in the classrooms as the trainer’s prescription.

It was very difficult time for me as a trainer. I was expecting something else so that I could refer to their beliefs and continue to discuss that idea. That day, my intention was to talk on “Self-reflection in Pedagogy”. But, the arguments of the participants were very far

from the ideas of self-reflection. I made an ad-hoc decision. I asked half of the participants to remember one of their “Best Classes” and, the other half one of their “Worst Classes”. I noticed that all of them confusingly looked at each other, hoping the next person would break the ice. Some of them might have thought that participation in such nonsense activities was worthless. Without giving much time to think, I asked them to share one experience from “The Best Class” and one from “The Worst Class”.

“Sir, when I taught vector first time to ninth graders, I could not make students able to understand. Not a single student solved question from Vector in the class test.” It was my worst experience, one participant shared.

“What did you learn from this class? Did you progress later while teaching Vector?” I immediately asked him.

“Of course, I reflected on my class. I came to know that I was not well prepared on that day. I searched some of the examples and consulted with my seniors on what to teach on the topic. Now, I feel comfortable to teach this lesson, and I believe my students also understand better,” he replies.

Thank God! He captured my words.

“Do you regularly reflect on your teachings?” I further asked focusing on his response.

“Yes, I do. Perhaps, we all do this.” He tried to generalise this looking at the mass.

I looked at my watch. I was running into the second half of my time. I had not started my sessions yet. I thought I needed to wind up the sharing session. I had set enough background on the topic I wanted to talk about. However, I had neither asked other participants to share their experiences on “The Worst Class” and “The Best Class” nor did they seem interested.

“I want to thank all of you for your active participation. I, now, want to begin today’s session.” I began my presentation formally.

I tactfully dealt with the published theme and the intended theme. The first slide looked like this.

Effective Ways of Teaching Mathematics:

Self-reflection in Pedagogy

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“Although there could be many effective ways of teaching, today we are going to discuss self-reflection as an effective way to improve our practices.” I started discussing the contents of the presentation slides. I completed my sharing rapidly. Due to the limited time, I could not share examples and some ways of reflection on that day. In fact, I did not enjoy myself though I tried my best to capture the basic things I planned.

I completed my session. Some participants passed compliments on my session. Some asked me about the solution to some particular problems. I often see beginner teachers who come to the training session with some difficult problems. I tried to make them happy. The publisher provided me with a list including the names of the participants, their e-mail IDs and contact numbers. The day was over.

When I returned home, I reflected on my session. Did the participants get what I intended? Of course, they might have benefited little, but it was not sufficient. I could not manage time for the second half. I had their e-mail IDs. So, I thought I should write a letter to the participants so that they could benefit in regard to improving their practices of teaching through Self-reflection.

Dear Friends

Namaste

I do hope that this e-mail finds you well. I enjoyed today’s session on “Effective Ways of Teaching Mathematics: Self Reflection in Pedagogy”. Perhaps, you too found it useful. The notion of Self-reflection cannot be captured in a short session. I tried to share with you many things, but I could not. Some of you had shown deep interest in these ideas during/after the session. So, I am writing this e-mail to supplement further on the ideas we had discussed today. I do hope that you will find it commendable.

Dear Friends,

Self-reflection is about thinking over own actions and acting in interaction with the environment, and with the colleagues, which can have inner dialogue with him/herself. While doing so, it creates a sense of empowerment, self-realization and solidarity with the teachers. So, it is taken as an agent of change (Artzt & Armour-Thomas, 2002). I believe that the better teaching approach cannot be generated over night; it is neither a ready-made stuff to apply as it is from someone’s experience nor is it a skill that can be developed from a session in a conference or through training. In this context, I remember one of my favourite writers Parker Palmer (1998), who mentioned that, if we want to improve the quality of college teaching, a million workshops on methodology will not be enough. Good teaching does not come from technique. It comes from the identity and integrity of the teacher. Teaching is a continuous process, which can be developed through observing ones’ own practices. Today, many of you asked me to share the best tips and techniques of teaching. I also used to think the same in the

beginning. I have spent many years looking for the best techniques believing that there are techniques that last forever. Today, I do not believe in it. We need to search better techniques through self-reflection, but not the prescribed techniques. Van Manen (1991) warns educators that in our pedagogical living nothing is ever completely foreseeable, predictable, and manageable. It is usually not until afterwards that we have the opportunity to think reflectively through the significance of the situation.

Reflection is definitely a vital skill as it can be considered to be a key to teacher development. It can be either intuitive or systematic and organized; it enables teachers to become aware of their limitations and strong dimensions. Pollard and Tann (1993) believe that the process of reflection feeds a constructive spiral of professional development and competence (p. 4). Absence of such awareness would make further growth of a teacher impossible.

As a teacher, we normally follow the schedule of our institutions, we go into the class, spend the allocated time with the students, sometimes give time for assignment correction, leave the class after the bell rings, conduct tests as per the calendar routine, meet with the parents, etc. We try to follow our institutional calendar. In my opinion, these actions are routine actions. There is difference between routine action and reflective action. Dewey (1933) has distinguished between “routine action” and “reflective action”. Routine action is influenced by “tradition, habit and authority and by institutional definitions and expectations....it is relatively static...” while reflective action demands desire to think over one’s actions and work on his/her development, which “implies flexibility, rigorous analysis and social awareness” (p. 14).

Here, I want to share three types of personal reflections (as discussed by Pesci, 2009): autobiographical reflection, reflection of own classroom practices, and reflection on specific mathematical contents.

Autobiographical Reflection

Every teacher was a student of a time. A teacher has various experiences of several years as a student, and may be as a member of different stakeholders. In autobiographical reflection, a teacher writes his/her personal relationship with mathematics, with reference to his/her history as a student, as a teacher, may be as a parent and so on. While writing the professional stories of the teacher, s/he can use different metaphors, such as “mathematics teaching is like entering into a forest, or a challenging game, or a long marathon, etc.”. The other teacher might write, “Mathematics teaching is like swimming, playing a game or listening to the music. Here, two of the teachers have expressed their views in a different way. Writing an autobiography provides opportunity to know self – interacting as a mathematics teacher. It also helps to explore a series of personal stories, critical moments, and the changes occurred in personal life. Personal experiences, challenges and triumphs can raise a

voice so that others in similar situations may gain better insights. Autobiography has deeper didactic designs beyond the surface narrative. We may try to explore them for insights into the reality of the self's transformation throughout life, and the underlying factors that shape that transformation (Taylor, 2015). So, I suggest you to begin by writing your own experiences of teaching, and examining them.

Reflection of Own Classroom Practice

Teaching is a complex job. I do not believe that participating at workshops and conferences develop professionalism in teachers. We, teachers of mathematics, have to commit to the continual improvement of our teaching practice and take opportunities for our personal professional development. For this, reflection towards our own practice is mandatory. I envisage that self-reflection can help pacify the extremeness of criticality by pointing the finger at self-practices (Gay & Kirkland, 2003, as cited in Luitel, 2009). I sometimes go to the classroom with a tentative plan; how to begin the class, what activities to conduct, how to present the ideas, what to expect from my students, and what methods to apply for evaluation, etc. Unfortunately, for many days of my initial teaching career, I could not apply my plan in the classroom. In those days, I took myself as a weak planner or sometimes a weak implementer. Later, I gradually realised that the teaching would not be appealing if it always goes according to pre-assumed situation. Reflection towards our own action helps to shape the more appropriate planning in further class. Reflection does not mean only seeing the past practices; it is about searching better alternatives. It is an ongoing professional practice.

Reflection on Specific Mathematical Contents

In such reflection, teachers reflect on the mathematical contents that are supposed to be taught in the class. According to Beswick (2012), teachers' mathematics knowledge is generally problematic in terms of what teachers know, and how they hold this knowledge of mathematics concepts or processes, including fundamental concepts from the school mathematics curriculum. They do not always possess a deep, broad, and thorough understanding of the content they are to teach. This is extensively found in developing countries, where teaching career is not taken as the prestigious job, and teachers are not highly motivated.

So, I humbly request you to begin reflective practices on at least the above three dimensions of self-reflection from today onwards. It will surely help you identify your weaknesses, strengths, and you can develop possible "tricks", "tips" and "techniques" that can be applied and you can revise them in your contexts as most of you have been looking for the same.

I do hope that we will be in touch and share our experiences with one another.

Best wishes from

Binod

Final Thoughts

In this paper, I portrayed my narratives keeping the issues of teaching and learning mathematics at the centre. I began my narratives describing how I was labelled as a “good” mathematics student, and later as a “smart” mathematics teacher, as a problem solver of routine and decontextualized textbook problems. With the help of my lived experiences as a “tricky teacher”, I tried to discuss how a teacher uses readymade techniques of remembering and solving mathematical problems as better pedagogical tools, and the culture of taking experts’ prescription as the ultimate ways of teaching. I gave enough space to discuss critical self-reflection as a tool to improve pedagogical practices rather than searching the tips and techniques provided by other people.

Assessing my long journey with deep-seated beliefs on conventional ways of mathematics teaching, I found that my beliefs got revised with the very powerful metaphor; teaching as a reflective act which is a major approach to transform the pedagogical practices. Here, I understood the notion of reflection in the field of mathematics teaching for meaningful mathematical learning. This moment was a point of departure towards my journey of transformative education researcher that provided me with enough space to make better sense of my ongoing practices as a mathematics teacher, and to explore alternative approaches by suspending my deep-seated notion of disempowering pedagogy.

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