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Editorial

Drama-Based Pedagogy: Ways of Engaging in Mathematics Learning

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Abstract

Mathematics education program always falls under public criticism because of being unable to produce desirable outcomes. From the beginning of formal mathematics education programs in Nepal, mathematics teaching-learning activities have been dominated by the informing and pouring pedagogy for preparing final examinations. Mathematics curricula, contents and pedagogical activities have not bridged the gap between official (formal) mathematics and the learners' lifeworld practices that support creating the mathematical 'Othering'. Likewise, mathematics education programs become unclaimed entity at the crossroads in which no one is willing to take sole responsibility and ownership of the programs but orienting to blame others. Such a blaming culture restrains engaged teaching-learning activities. Against this backdrop, this argumentative paper argues for incorporating the DBP in the mathematics classroom to create an engaged teaching-learning environment. We have metaphorically captured the five significant theoretical features of DBP as/for contextual learning, academic enhancement, reflective practice, agentic development and social wellbeing. Finally, we have briefly described the implications of DBP in mathematics classrooms.

Keywords: Academic enhancement; Agentic development; Contextual learning; Dram-Based pedagogy; Engaged learning; Reflective practice; Social wellbeing

Setting the Scene

Mathematics teaching-learning activities in schools and universities in the context of Nepal have been suffered from the informing pedagogy in which both students and teachers rarely engage actively in the learning process (Pant et al., 2020; Lamichhane & Dahal, 2021; Lamichhane, 2022). Pedagogical activities have devoted to disseminating official knowledge endorsed by authority as worthy of learning. In the long run, it has instigated the views of mathematics as a pre-existing package of knowledge and skills and further promoted the narrowly conceived pedagogical approach of installing mathematical knowledge and skills in the learners' heads. Un/knowingly practitioners are captivated by the views of learning as/for solving bookish questions and preparing for the upcoming examination and orienting their activities accordingly. The overemphasis on lock-step algorithms and official knowledge restrains the learning process within the reproduction of bookish knowledge and theorems

which are far from learners' lifeworlds. The detachment of mathematics practices from the lifeworlds of the learners supports the creation of 'Mathematical Othering' (Abtahi et al., 2020).

Mathematical othering concerns the relationship between mathematics and learners (teachers and students) that occurs as a result of its curricular, pedagogical and ways of assessing students' outcomes. Decontextualized, ahistorical and isolated curriculum practices (Luitel, 2018), pedagogical emphasis on memorization, speed, and reproduction (Pant et al., 2020; Lamichhane & Luitel, 2022), externally executed standardized approach to assessing students' outcomes (Lamichhane, 2018) and ignorance of onto-epistemic practices of non-Western countries (Lamichhane & Luitel, 2023) are some of the causes behind the mathematical othering in which students rarely see the connection between official knowledge they engage in schools and universities and the mathematics they experience in their lifeworlds (Wager, 2012; Abtahi et al., 2020). Mathematics become an elite discipline and only be a part of the academic lives of learners at schools and universities but not embedded in their lifeworlds. As a mathematics student, I (first author) have encountered many definitions, axioms, tacit rules, procedures, and theorems that must be learned without conceptual and relational understanding and their real-world applications. For example, I learned a definition of an exponential function as "let a be a positive real number ($a > 0$), then a function which is in the form of $f(x) = a^x$, for all real number x, is called an exponential function". I did not understand its meaning, essence and application and how it formed; however, I memorized it by rote and also made a rule of memorization as a function whose base is constant and the index is a variable called exponential function. I did not know whether it was right or wrong.

The rote memorizing and deployment of the authoritative rules can lead the practitioners to become accumulators of discrete chunks of knowledge, further creating a distance between students and mathematics, which is one of the significant challenging problems that possibly deterrent learners' deep engagement in the learning process and thus they are urged to celebrate windy rhetoric of learning as a reproduction of mathematical knowledge (Lamichhane, 2022). How can we create a better learning environment that provides ample opportunity for both students and teachers to deeply engage in the learning process through their potentiality so that they can critically solve real-world problems? It is one of the prompt issues of mathematics education in Nepal. we have realized that the mechanistic pedagogical approach, which assumes historical, social and cultural presence in mathematics curriculum and pedagogy in which the learners grow up as obstacle forces rather than harmonizing forces to create a learning culture (Lamichhane, 2022) resulting in underachievement of mathematics and negative images of mathematics-an abstract, cold and dry, dispassionate, infallible (Sam, 1999) and foreign (Luitel, 2009, 2013) and thus bear public criticism. It signifies that it is necessary to lessen mathematical othering and informing pedagogical practices to create a dynamic learning environment that helps teachers and students deeply engage in learning. In so doing, Drama-Based Pedagogy (DBP) might be one

of the alternatives that open up the range of possibilities of socially, academically, emotionally and aesthetically engaging in learning (Lee et al., 2014; Dawson & Lee, 2018; Alacapinar & Uysal, 2020). In this regard, this argumentative paper aims to explore theoretical features of DBP that underpins engaged mathematics learning.

Engaged Mathematics Learning Through DBP

DBP is a collaborative and cooperative activity that allows teachers and students to engage deeply in the teaching-learning process physically, cognitively, affectively and socially, which are rarely considered or discussed in mathematics classrooms except in cognitive engagement (Dawson & Lee, 2018). Due to over-reliance on the cognitive aspect, mathematical teaching-learning activities in schools and universities remain far away from the lifeworlds of the learners that underpins developing the negative images, attitude and beliefs towards mathematics (Sam, 1999; Luitel, 2009; Lamichhane & Belbase, 2017). In this context, we have discussed some key theoretical features of DBP in the following subsections under the five themes—DBP as/for contextual learning, DBP as/for academic advancement, DBP as/for reflective practice, DBP as/for agentic development and DBP as/for social wellbeing.

DBP as/for Contextual Learning

DBP is an emerging and alternative approach in mathematics education that offers a learning environment in which students and teachers are simultaneously engaged in the learning process by acknowledging the historical, social, and cultural milieu (Dawson & Lee, 2018). DBP can bring historical events and evidences as a form of props in drama as well as objects of learning. It helps connect formal/official mathematical knowledge and concepts to real-world problems. We can design and perform dramatic acts to illustrate our historical measurement systems in different ethnic/social groups. It helps students familiarize with the historical tools—*Mana, Pathi, Dharni,* etc. and ways of exchanging the goods and crops that support linking the present measurement system—an international standard unit (SI Units), with their historical practices. Likewise, dramatic activities of social practices—planting, harvesting and preserving crops; designing and constructing buildings; selecting/electing social/school/class leaders; playing games, telling stories, singing songs, etc. can be helpful to exemplify the mathematical concepts. Finally, cultural practices—ritual ceremonies and cultural heritages such as temples, royal places, monuments, cultural painting, cultural dances, etc. can be brought into mathematics classrooms through drama support to bridge the gap between official knowledge and real-world practices. Through drama, we can easily communicate the historical, social and cultural information and practices emanated through our ancestors by integrating it with mathematical activities that facilitate the transfer of such rich knowledge into the lives of the practitioners that, truly making learning meaningful (Alacapinar & Uysal, 2020). Likewise, the dynamic and creative interplay of historical, social and cultural practices through drama creates an environment appropriate for diverse learners because of its

incorporation of physical, emotional and cognitive aspects of learning that enable the learners to intuit and make meaning collaboratively further support to academic enhancement (Fleming et al., 2004).

DBP as/for Academic enhancement

Another adverse effect of informing pedagogy pervasive in Nepali schools reflects underachievement in mathematics. The National Assessment of Students Achievement (NASA) report indicates that the mathematics achievement of school-level children has continuously decreased since the last decade (Education Review Office, 2020; 2022). The report also explored that Nepali students have poor higher-order thinking/reasoning and fail to connect classroom mathematics with their lifeworld. In this context, DBP can create a learning environment in which students not only observe the relationship between classroom mathematics and their lifeworlds practices but also have an opportunity to participate in performative actions to enhance their understanding and interest (Sharda, 2014), making learning long-lasting that obviously enriches the mathematics achievement (Haris et al., 2009). Kariuki and Humphery (2006) also found that students who were taught by DBP had significant achievement in mathematics. Moreover, Fleming et al. (2004) explored that DBP has significantly contributed to developing positive attitudes toward mathematics compared to traditional pedagogical practitioners' counterparts. DBP has the potential to incorporate learners' cognitive and affective aspects and contribute combinedly to improve academic achievement in mathematics and other disciplines (Duatepe-Paksu & Ubuz, 2009). This discourse indicates that underachievement in mathematics is a result of informing and pouring pedagogy (Lamichhane & Luitel, 2022) in which the teachers are so habituated that they penalized the students who give creative solutions in their final examinations (Mathema & Bista, 2006).

Teaching-learning activities in mathematics classrooms have not encouraged the students to be creative, imaginative and critical thinkers because of the narrowly conceived views of learning as the reproduction of an already existing body of mathematical knowledge. It is worthy to include that "the examiners awarded a correct construction by a student zero marks. Student did differently and correctly for which he was punished" (Mathema & Bista, 2006, p. 156) (Figure 1). It is because the marking scheme instructs to draw AB = 7 cm horizontally and then complete the construction, but students did it differently but correctly. What does it indicate? It is one of the significant deficiencies in mathematical pedagogy in Nepal and probably most countries where mathematics education

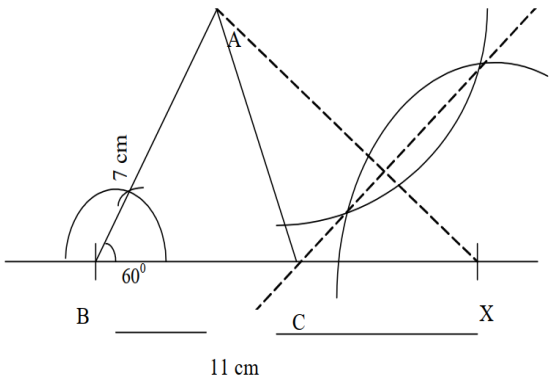

Fig. 1: Correct construction by student. Adopted from Mathema and Bista (2006).

practices celebrate absolute truth and objective epistemology in which teachers are already deskilled and can only perform a routine job (Grundy, 1987). This discourse signifies that to enhance academic achievement in mathematics, we need to instigate epistemic pluralism in mathematics teaching-learning activities in which both students and teachers can enjoy their socio-cultural ways of knowing through the dramatic play in mathematics classrooms that provide enough opportunity to reflect their teaching-learning activities critically and help dynamize mathematics pedagogy (Dawson & Lee, 2018).

DBP as/for Critical Reflective Practices

Mathematics must raise the possibility of alternative thinking, reasoning and doing rather than shutting them down. The lock-step algorithm pervasive in Nepali mathematics education restrains creative, imaginative and critical thinking because it does not go beyond the textbook questions. Most textbook questions are quite strange to the learners because of the adoption of questions from foreign textbooks, creating the mathematical Othering (Abtahi et al., 2020). In this context, DBP creates an environment in which practitioners can deeply engage in mathematical activities through actions and reflections that energize the learners physically, cognitively and affectively (Alacapinar & Uysal, 2020), which are crucial not only for mathematics learning but also other subject areas.

DBP offers teachers and students to integrate arts into the subject areas that permit them to demonstrate their experiences through the artistic ways in which they can express their opinions by means of physical actions, dialogues, storytelling, and fiction, to name but a few that help relate classroom learning with their contexts enable learners for meaning making and reflecting in variety of ways (Dawson & Lee, 2018). Mathematics pedagogy relies on learning by doing without reflection, leading to rote memorization and blind algorithms that isolate the known from the knower (Dewey, 2001), further instigating epistemic singularity. In this context, DBP offers teachers and students a dynamic way to engage in learning in which students reflect their cultural, social and institutional understanding of the subject, possibly helping to raise critical awareness. For example, if we use dramatic play to demonstrate the land/property/wealth distributions of certain societies help understand the asymmetry of wealth distribution and observe its impact on their livelihood. In this case, it obviously raises the practitioners' critical awareness. Critical awareness supports calling practitioners' past experiences, observing their impacts on present actions and envisioning future practices (Schön, 2017) that break the boundary of informing and pouring pedagogy in mathematics education.

Through the implementation of DBP in mathematics classrooms, students who engage in dramatic activities have an opportunity to be critical reflective practitioners of their practices and their interlocutors' behaviours, attitudes, emotions and abilities (Chaviaris & Kafoussi, 2010). Students can take risks and responsibilities that help them to make different interpretations of mathematical content and research finding as well lead to draw a wise decision. It signifies that the DBP not only help better learning of mathematical concepts but

also provides the best opportunity to have concrete experiences, reflect on their past learnings, and envisage future plans by amalgamating their thoughts, emotions and actions. DBP allows every student to participate in the learning process through the diverse ways of performing—sharing of shared experiences, wiring a journal entry, drawing and painting canvas, performing cultural acts, engaging in social/political dialogues, dancing and singing, among others help for developing agentic aspect (Dawson & Lee, 2018) of learners that enable the learners to make an informed and wise decision.

DBP as/for Agentic Development

Many research scholars (Luitel, 2009; Lamichhane, 2017, 2018; Pant, 2016; Lamichhane & Belbase, 2017) have mentioned elsewhere that there is a blaming culture in mathematics education programs of Nepal. No one is ready to take sole responsibility for mathematics education, and it becomes an unclaimed entity at the crossroads. Authorities, basically who are directly involved in the educational planning and policies and curriculum design process, blame the teachers; teachers blame students and parents, and finally, students and parents blame the teachers and authorities, which creates a vicious circle of blaming, resulting in non-transformative (transactional, status quo, cultural reproduction, reactionary, value-free, ahistorical, acultural, etc.) actions. Authorities claim that they set educational planning and policies and design the mathematics curriculum to meet the basic requirements of the 21st-century globalized era, but teachers are responsible for the mal-implementation of the educational policies and curriculum. Teachers ventilate their dissatisfaction on educational policies and curriculum because they are not solely involved in educational planning, policies and curriculum design process. They also point out the weakness of students and their parents for not bringing the desired outcomes. Finally, students and parents make elusive claims regarding the role of teachers, concerned authorities and government as well for being unable to properly design educational policies and curriculum and fail to implement the educational policies and curriculum appropriately. It shows that no one takes authorship and ownership of the mathematics education program. The lack of ownership of the implemented programs indicates that most concerned authorities (teachers, curriculum designers, policymakers, and government) hold a job mentality and perform their file duties without realizing their sole responsibility (Grundy, 1987). In this context, DBP is a pedagogical strategy that makes teachers and students responsible so that they can take authorship and ownership of their learning (Dawson & Lee, 2018).

Authorship and ownership of learning are two major pillars of agentic development. In DBP, teachers and students have engaged in mathematical activities in which they openly challenge, critique, show their free will, and offer an alternative approach that helps envisage empowering pedagogy. When practitioners get a chance to get involved from the beginning of the academic activities, support for understanding the embedded factors, components, forces and different interests of stakeholders. In this situation, practitioners can observe the

connection of hidden interests of different groups, particularly the ruling class, their attitudes, and the dominant ideology that shapes mathematics education and its pedagogy, raising a level of awareness that ultimately leads to agentic development. During this process, practitioners "harness the power they have […] to direct, decide, and function, thus becoming more responsible and agentic in what they learn" (Dawson & Lee, 2018, p. 18). Moreover, DBP has provided a learning environment in which practitioners collaboratively engage in a learning process that boosts a cooperative culture rather than a competitive mentality that supports harnessing the necessary aptitude for social wellbeing.

DBP as/for Social Wellbeing

DBP is a collaborative and cooperative approach to engaging in the mathematics learning. It creates a learning environment in which students develop their collaborative skills through role-playing in which every character of the drama cooperatively builds and enhances their characters in which both actors and audiences immerse in the situations, and thus, they internalize the contents demonstrated (Coleman & Davies, 2018). Mathematics education practices from the very beginning of formal schooling in Nepal around 1834 have been dominated by the competitive mentality that has been instigated by Western modern worldview and focuses on high-stakes tests that help erode collaborative culture emanating through historical practices of our ancestors (Powell, 2022). Competition is not the aim of education that enhances the individualistic endeavour and leads practitioners to be more narcissistic and self-indulgent, which indirectly insists on unhealthy conflict in society and nation as well. Due to the overemphasis on competitiveness in education, learners hold a strong desire to be more successful than others rather than developing social responsibility, ethical sensibility and spiritual compassion. These components enable learners to be collaborative and cooperative practitioners (Chaviaris & Kafoussi, 2010) that further sprout a sense of codependence and coexistence that could be beneficial for the trust-building process, a significant attribute of conflict management in a society, thus contributing to social wellbeing. Here, my argument is that pedagogical practices in mathematics education, in particular, and other disciplines in general, are not only the means for disseminating the pre-existing body of knowledge to learners and/or creating new knowledge but also could illuminate a way of living, communicating, respecting, recognizing and connecting that enabling practitioners to realize the value of wellbeing in society and nation and thus orienting to create a living environment not only for the humankind but all living creatures and non-living objects as well. In this regard, no one can deny the role of DBP in fostering the social, cultural, ethical, emotional and physical wellbeing of the practitioners because it recognizes the pluralities of values, truths, and ways of learning irrespective of origins, caste/ethnicity and culture. It signifies that learners who grow up with DBP have the quality of being familiarized with the newly emerging environment, the capacity to work in groups, the ability to communicate their views and visions easily, the power of reasoning for and against a particular issue, the aptitude of tolerances,

flexibility and resilience and sense of belonging (Dawson, & Lee, 2018) that contribute to social wellbeing.

Conclusion and Implications

Disengaged pedagogical practice in mathematics education in the context of Nepal has become a significant problem that restrains the mathematics teaching-learning activities in preparation for the upcoming examination. Even though mathematical pedagogical activities focus on preparing for the final test, students have not got satisfactory results. School mathematics achievement during the last decade has gradually decreased, and students have not performed well in higher-order thinking problems (ERO, 2020,2022). It indicates that the problem of disengagement in mathematics pedagogy needs to be addressed. From the above discourse, we have realized that DBP is one of the ways to engage students and teachers in mathematics teaching-learning activities. DBP offers an opportunity for teachers and students to engage deeply in the learning process physically, cognitively, affectively and socially. It enriches academic achievement in mathematics, creates the learning space in which critical reflective practices have taken place, develops the agentic aspect of the learners to make informed and wise decisions and supports social wellbeing. Last but not least, this paper suggests that DBP might be one of the alternative approaches to traditional informing pedagogy to create an engaged teaching-learning culture.

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