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Students' Empowerment in Mathematics Classroom: Perception, Strategies, and States

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Abstract

Whatever the existing teaching-learning practices of mathematics education in our classroom, it is a time to escalate its effectiveness through sincere exploration of students' empowerment. Empowering our students in mathematics classroom is a psychological, strategic and contingent to both mathematics' teachers and students. This article argues that exploration of understanding of students' empowerment, empowering strategies, and state of empowered mind are not fully studied yet. To capture the belief, understanding, perception, and practices of students' empowerment in mathematics teaching and learning is the core concern of this paper. The secondary level mathematics teachers from the community schools of Kathmandu valley and mathematics educators were purposively selected. Descriptive exploration was made to discuss the information on three key focuses; perception of students' empowerment, strategies for empowerment, and states of empowered students within the classroom premises. Opportunity of collaborative and cooperative engagement which accept the individual voice of students in the mathematics classroom is perceived as the strategies of students' empowerment. Sufficient cognitive as well as affective actions that help to build the students' strength in learning mathematics are the fundamental empowering strategies and the condition of happiness, satisfaction, and on task behaviour are the states of empowered students. Policy makers, academicians, and even the managers would take benefit from finding of this article. There are still many spaces to reduce the gap of existing and expecting strategies for students' empowerment in the mathematics classroom.

Keywords: *Classroom Environment, Classroom Strategies, State, Students' empowerment, Effective learning.*

Introduction

Mathematics classroom is occupied by the two-leading agents in the teaching and learning process in any context. They both have the responsibility to make collaborative and cooperative classroom environment for effective mathematics teaching and learning process. The effectiveness in teaching and learning relies on the learners' empowerment

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belief and practices toward their teacher, content, classroom environment, and their active affective and cognitive engagement in learning. Students' empowerment in learning mathematics within the classroom premises have perceptional, strategical and context differentials. How do we, as mathematics teachers and educators, frame and generate the meaning toward the student empowerment? How do we empower the students and how do we evaluate and identify empowered conditions of students in the mathematics classroom? Answer of these questions are emergent. Considering the mathematics classroom scenario, the student empowerment in relation to teacher's belief, power-empower perception, and practices in mathematics classroom became an issue to explore perception, strategies and states of empowerment. Participants' real experiences, emotions, feeling, strategies and overall behaviors toward effective mathematics learning are the interests of exploration on the basis of student empowerment. So, combination of cognitive and affective domain that associate students' empowerment became the emerging and curious area that this paper attempted to explore in context of mathematics classrooms in Nepal.

Students empowerment

The assurance of voices and participations of students in mathematics learning in or outside of classroom is the process of empowering. The equity treatment and justice (Wright, 2016) practices with sufficient engagement and discourse platforms to the students so that they are motivated toward effective mathematics learning is empowerment. Empowerment (Zimmerman & Perkins, 1995) is more and different from the students' self-esteem, self-efficacy and ways of being controlled. Increasing strength and confidence toward the discipline, activities and belief system whether the students is special or not is empowering process. It is seen in the classroom process where individual students make a closer correspondence between his/her mathematical goals and efforts to achieve them. Students need appreciation and adequate adjustment (Bloom et al., 1956) toward mathematics learning through affection. Interest, attitude and values assessment in mathematics learning of students in well classroom environment is key concern in these days. In mathematics learning realm, other than spiritual, political and economic strength, empowerment (Thomas & Velthouse, 1990) develops confidence on students and enhances own capacity to do mathematical activities in the classroom. Empowering students is not only a major motivational factor in academic arena but also redefine mathematics teachers' role as professional helper through the use of empowerment-oriented language (Rappaport, 1981).

Moreover unequal recognition of students' first language, world view, sociocultural background, life struggle, knowledge status (Kaur & Hoe, 2017) may hamper the empowering condition of the students. Ultimately, empowering students in mathematics classroom is an investment through which students' potentiality in mathematics learning and achievement can be examined. Focusing on these issues and statements, empowering students in mathematics learning process has become emergent.

Existing context of mathematics classroom

Empowering students in mathematics classroom is not an objective process. Empowered students depends upon the content, context, experiences, rationality and knower of it. Observation of identifiable students' behavior and their phenomenological strength and discourses (Bell, 1978) on it would be the practicing approach of empowering students in effective mathematics learning.

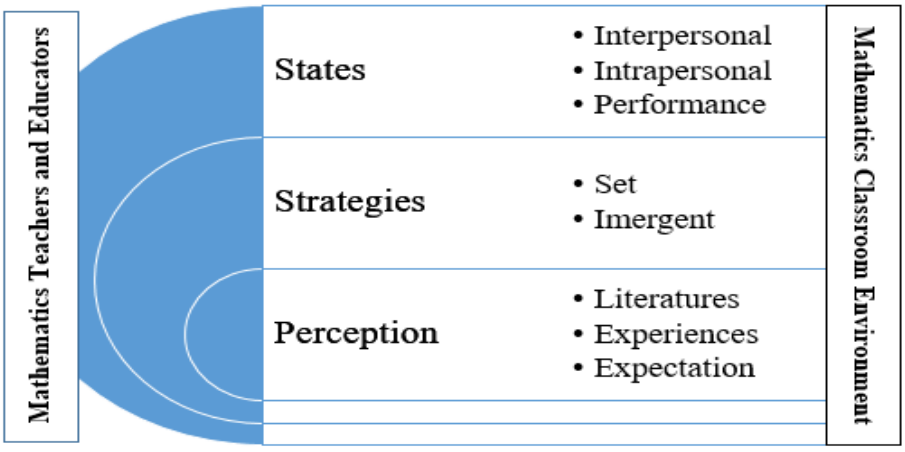
Here, it is argued that the subject of empowering students and its impact in learning mathematics education has not been fully studied yet. Mostly, in mathematics classroom in Nepal, research studies are based upon cognitive goals oriented which may not be sufficient to empower students. So, it is better to add through affective domain approach and its practices in mathematics education for the students' empowerment. Motivation, feedback and reinforcement, encouragement, and attraction on learning mathematics to the students through learning theories and models are highly explored, practiced and assessed throughout the mathematics teaching-learning. However, I want to see the visible behavior changes (Grootenboer, Lomas & Ingram, 2008) as the students' empowerment in mathematics classroom, so that higher achievement in mathematics is possible. Moreover, why do students feel difficulty in learning mathematics (GoN, 2076)? Why do students still perceive that mathematics as a difficult subject? are the striking questions in our mathematics learning.

Similarly, when I used to teach mathematics, I experienced that there was the lack of establishing/re-establishing relation, trust on mathematics teachers and acceptance of students doubting through the constructive way. Thus, how is students' empowerment perceived in mathematics classroom? Do you, as a mathematics teachers, have a set of students empowering strategies in your mathematics classroom? And, how do we realize and identify the state of students' empowerment? were the guiding issues in this article.

A strategic framing for students' empowering

Main purpose of the research was to explore the understanding of students' empowerment, its strategies and motivating behavior observed in mathematics classroom. To fulfill this, a study frame was developed to delimit the research activities as shown in figure 1. It saved and blocked me to use external connection of student empowerment rather than mathematics classroom. It also supported to me to avoid the unnecessary garbage and received smooth sailing of my research work. I identified three key focuses named, perception, strategies, and state. Their embedding positions where perception is in crux; strategies is in middle core and state is as outer part. All these were interacted with mathematics teachers and educators to make the meaning and fulfill the research objectives. It was fully discussed on the basis of mathematics classroom boundary of community schools of Nepal.

Figure1: Framework for empowering the students



Perception: The embedded bottom layer of Figure 1 says the individual belief, views, introspection toward the student empowerment. Some meaning and understanding of empowerment were hope to frame from the previous works on it. Moreover, mathematics teachers and educators both have the teaching as well as research experiences that would help to develop the perceptional meanings. Their practices and experiences would not capture the motivational belief what they expect during classroom activities. Thus, exploration of belief, understanding and meaning of students' empowering in mathematics learning were framed through the subdivision of perception focus into literatures, experiences and expectation.

Strategies: What rules and strategies were practiced to empower students in mathematics learning process? This was focused in the middle layer in figure 1. In addition to the set strategies, it was hoped to explore the expected strategies through this research. Empowering students through actions and strategies applied by the mathematics teachers in the classroom was the better focus. Empowering strategies was taken as more precise than perception. These strategies would be already set in legal documents or developed by school management committee or through classroom code of conducts. Interdisciplinary empowerment strategies were taken as the set of strategies in the process of teaching-learning activities. In other way, incidental, ad hoc, and emergent strategies would be applied by mathematics teachers. The emergent side of strategies would also be informal procedural rules, self-manipulation and behavioral practices.

State: How do we evaluate the conditions of empowered students? This was focused in outer layer in above figure 1. It was assumed as the higher cover of student empowerment which includes both informants' perception and strategies applied and expected to apply in the mathematics classroom. Generally empowered state is measured through the outcomes and impacts (Ernest, 2002). Dynamism, criticality, behavior modification, adaptation and

so on would help to make meaning and discussions under the key focus "state". I obviously thought and believed that empowering processes and outcomes vary from respondent to respondent in all contexts.

Methods of the study

This article is a supplementary inquiry to add to the full issue of teacher's power and students' empowerment in mathematics classroom. Perception and understanding of students' empowerment, strategic rules, and state of being empowered in mathematics classroom were captured using explorative qualitative approach.

Mathematics teachers and mathematics educators were the key informants to gain the perception, strategical practices, and their insights toward the state of students' empowerment in learning mathematics. Purposive sampling was applied to select the key informants. The permanent mathematics teachers were selected as key informants from government and community schools and mathematics educators were designated from the university mathematics lectures. It was possible due to personal contacts of being colleagues and the help of research experts. At the end of article completion there were only three mathematics teachers and three mathematics educators. The semi-structured interview guidelines (see Annex A) were prepared to both group of respondents. Similarly, the focus group discussion (FGD) guidelines (see Annex B) were developed for the consensual belief and meaning toward the key focuses. Pandemic benefitted me to make use of the mathematics teachers who have blended knowledge of physical classroom teaching learning practices and virtual practices.

Written leading questions based on the study focuses were sent to participants via e-mail and messenger. It was informed about research objectives, requesting them to support upmost, and be free to response in emic and etic points in paragraph within their own possible date of response. I collected their responses after many informal conversations and follow up. It was parallel work of collecting written responses and analysis. Basically it was descriptive exploration of the phenomenon. Thought units were separately transcribed to categorization, memoing and key notes were used in reflection and analysis. Once a draft of interpretation were made, it was resent to the respondents to add, modify, and reduce according to their intention of saying. Several virtual common discussions as FGD and one to one discussions were made which supported to make the meaning of students' empowerment in mathematics classroom. Furthermore, it helped to derive the results and insightful discussion on empowering strategies, their practices in our classroom and assessment of empowered conditions of the students.

Results and discussion

Descriptive interpretation of key focuses is made in this section. Different views of respondents, key notes and researcher's reflection, and the literatures are combined under separate sub-heading; perception of students' empowerment, strategies of students'

empowerment, and the states of empowerment. The pseudo names of my participants were used in explanation of desired focuses.

Perception of students' empowerment

Answer of the question like, how do we make own views towards student empowerment in mathematics classroom, can be captured from different subjective dimensions. Here, I delimited them to mathematics educators and mathematics teachers' experiences and beliefs, fundamental literatures, and classroom contexts. Bijaya, one of my keys informants perceived that "…. empowerment is the strengthening students' voices and participation in classroom decision and activities…." Gopal as mathematics educators put his additional views on understanding of student empowerment making positive classroom environment so that students feel safe and collaborative is the learner's empowerment. Agreeing the understanding of other participants on FGD, the Shekhar made the common consensus that the state of mind and body in which students are always ready to take part any mathematical activities with their responsibility is student empowerment in mathematics teaching and learning. I reflect that valuing and organizing the affective mode of students in learning mathematics in the classroom for the active engagement and their motivation as said by Wright (2016) and Kirk (2012) is the students' empowerment. Not only this, the students' empowerment in mathematics is the blossom of students' passion (Thomas, & Velthouse 1990) and confidence development toward mathematics knowledge, skill, and understanding. The place of voices, opportunities, engagement, responsibilities, and ownership of classroom environment rather than "to give power to" (Thomas, & Velthouse 1990) is the value laden understanding of students' empowerment in mathematics education.

Strategies of students' empowerment

Mathematics teachers have been using and expecting various rules, courses of action or ways to empower their students. So, that can feel satisfied and being in effective teacher's position. It is believed that no single standard fully captured and support the empowering students in mathematics learning through connecting process and outcomes for all students in all contexts. Consultative virtual interactions, written responses linking with available references, I realized that it is difficult to sorting the fixed strategies to empower students in our mathematics classroom. The classroom discipline rules developed by school management and teachers are sufficient to me as stated by Reetu madam. In the FGD session, it became common to all participants and to me as well that some additional ideas would be necessary to address the more introvert and self-efficacious students. Similarly, it was convinced that mathematics teachers must play that role which extinct the undesirable behaviour of the students in the classroom. Deepjyoti wrote, "I used to solve various mathematical problems and queries by optimum connection with daily life problems, so that students are motivated to engage in mathematical activities…." He further justified that the use of Information Communication and Technology (ICT) for alternative ways of addressing the problems and inspiring the students by positioning their voices in learning mathematics helped him to attract his students. Participants subjectively summarized that proper use of learning

theories and pedagogical approaches of making empowered students in mathematics classroom. One interesting strategy to empower students have been practicing and better to practice by mathematics teachers was highlighting the importance and connection of mathematics education to the study of same grade other subjects like computer and science. Moreover the mathematics educator Bijaya emphasized that teacher can motivate and empower their students in learning mathematics by connecting the importance of mathematics education for higher study and impacts of mathematics education on beyond the school premises. Once Bijaya noticed the empowering strategies by Science teacher and he also tried that in mathematics classroom and found impressive. Externally, maintaining equity (Tutak, Bondy & Adams, 2011), balancing equality, recognition of students' cultural practices, appraising their full participation and engagement in mathematical activities with smooth and practical delivery of subject matter would be the additional empowerment strategies to the students. I felt that providing and using sufficient mathematics logistics with latest technologies to the students in the classroom increase the interest and make ready to learn mathematics effectively. Equity treatment as suggested by Tutak et al. (2011) in the classroom which helps to improve the individual relation with the students. Some of the participants have been focusing to empower their students in mathematics learning through strong application of mathematics education to investigate and challenge injustices and inequities rely on their own lives and wider society (Dhakal, 2019). Many discourses, puzzles, mathematical fun, and raising students' cultural positive incidents in teaching and learning mathematics would be the supporting strategies to empower students.

I wanted to add and ensure the strategy of reducing teacher's power in the classroom activities and satisfy and manifest the behavior of fairness, coordination, peace/silence, leadership, collaboration, and ultimately enthusiasm in classroom to develop students' knowledge and skill in mathematics education as the empowerment technique. We, as mathematics teacher, have to give positive feedback to the students who have lost their motivation in learning mathematics, would be the common strategies for empowering students. As the views shared by Acharya (2015), we have to use the strategies of individual communication and care to handle diversity and support to develop critical mathematical thinking to the students. Mathematics teachers need to avoid micromanaging to their students as claimed by Broom (2015) and have to gradually build students' capabilities so that students are in self-control and choices are their own in mathematics learning. This helps students to build their confidence in mathematics learning processes and ultimately results the empowered students.

States of students' empowerment

How do we know and ensure that the mathematics learner are in empowered conditions, is the main concern under this subheading. The state of empowered students is mostly physio-psychological aspect. As a result of meaning and understanding of students' empowerment in mathematics classroom of my participants, application of various empowering strategies on students, and my reflection, we agreed that there is still difficult to capture the empowered conditions. The mathematics teacher Suman used to evaluate his students

empowered condition as, "…. happy students within classroom discipline who frequently active in doing mathematical works are…". The motivation and then empowerment occurs in the students, "…. students who always ready to take part in mathematics quiz, group work and showing affirmative behavior regardless their economic and social background are also the notions of empowered conditions" observed again by Suman. We can observe the position and situation of classroom with sufficient collaboration and cooperation for the state of empowered students in learning mathematics in the classroom. Gopal has been noticing disempowered students in his classroom. He realized that when students have lack of classroom discipline and enjoy on off task behaviour, then it would not be motivated state for them. How do you build the teacher-students and students-students relationship in the mathematics classroom? Its characterization (Kirk, 2012) would be the notion of empowerment. Poor attitude toward teachers, contents, and knowledge make students apathetic. Consequently, they loss their confidence in learning mathematics and are in disempowered condition. Thus, overall students' behaviour in the mathematics classroom would be evaluated to identify the state of empowered student or not. Mathematics teachers have the challenge to the unpredictable and dynamic behaviour of the students. In that situation, the desired and observable behavioural changes that are accepted by Mangal (2017) would be also the notion of empowered students. Hence, as said by Houser and Frymier (2009), the empowered students feel more competent and are more motivated to perform every classroom tasks. They assumed that they have an impact on their learning process in the mathematics classroom.

Conclusions

This is the explorative research article on students' empowerment in mathematics classroom to address the issue on perception, strategies, and conditions of students' empowerment. It was carried on for in-depth insight of students' empowerment in mathematics classroom, so the effective classroom environment and then real mathematics learning is possible. Empowering students in mathematics classroom is an investment through which students' potentiality in mathematics learning and achievement can be examined. Not only this, the critical thinking opportunity and self-confidence in mathematics learning will be developed to the students. By the above discussion, students' empowerment in mathematics classroom is subjective, value laden and contextual to the mathematics teachers and educators. It energies students to do all mathematical activities and take their own roles and responsibilities. The process of building confidence in students toward mathematics contents, knowledge, skills, and cooperation and collaboration is termed as empowerment. Employing equity treatment, providing sufficient opportunities of engagement and participation, unleash the students' potentiality, individual creative feedbacks, inter and intra link of mathematics subject, proper and efficient utilizations of available resources, inspiring and role model like appearance of mathematics teachers and more are the basic strategies to empower students in the mathematics classroom. Empowering students is everlasting process in the mathematics classroom but the state of empowered students have to identify and do accordingly. Mood, behaviour, and presence of individual students

in the mathematics classroom plays a vital role of making classroom environment. Affective domain like procedures need to be well evaluated during teaching and learning mathematics to ensure the cordial relationship among students and between teacher and students. Thus the state of teacher satisfaction, safe and fun classroom environment, students' readiness and mindfulness in all types of mathematical activities and so on would be the empowered of students. Overall discussions, information, views of informants, and reflection showed that understanding of students' empowerment in mathematics classroom is more similar and convincing. Similarly, not so deviant meaning and perception toward students' empowerment were made by key informants that are available in literatures. However, there is still lacking of policy, regulation, and practical strategies for students' empowerment in Nepalese mathematics classroom. Moreover, there is the gap of set and expected empowering strategies and their real application in the classroom.

Implications

There was the curiosity remained not only in mathematics teachers and academicians but also to the policy maker, planner, and managers to know the meaning, strategies, and conditions of students' empowerment for effective learning of any subject at any level. It is hoped that it will be successful to address this curiosity. This study would be the milestone of improving our mathematics classroom through the real time practices of varied empowering strategies for the better learning of mathematics. Research showed that there is the lack of policy, regulation, and practical strategies for students' empowerment in Nepalese mathematics classroom. So, it is a right time of policy addressing. Similarly, our effort is necessary to reduce the gap of perception and expectation of empowering strategies and their real time practice in mathematics classroom to enhance the mathematics learning. It opens the new area of quantitative research in effective mathematics learning environment to ensure the higher aspiration in mathematics education through the selected predictors. Varieties of supporting blocks of students' empowerment are discussed in this article to build the sound pedagogical mathematics classroom environment mostly in the normal classroom situation. However, this research work sketches the line to empower students also in abnormal situations like any types of pandemic, natural disaster, and instabilities.

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