

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 time to escalate its effectiveness through sincere exploration of students' empowerment. Empowering our students in the mathematics classroom is psychological, strategic, and contingent on both mathematics teachers and students. This article argues that the exploration of understanding students' empowerment, empowering strategies, and state of empowered mind are not fully studied yet. Capturing 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 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. The opportunity for collaborative and cooperative engagement which accept the individual voice of students in the mathematics classroom is perceived as the strategy for students' empowerment. Sufficient cognitive, as well as effective 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 behavior are the states of empowered students. Policymakers, academicians, and even managers would take benefit from the finding of this article. There are still many spaces to reduce the gap between existing and expected strategies for students' empowerment in the mathematics classroom

Keywords: *classroom environment, classroom strategies, state, students' empowerment, effective learning*

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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 a collaborative and cooperative classroom environment for effective mathematics teaching and learning process. The effectiveness in teaching and learning relies on the learners' empowerment beliefs 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 perceptual, strategic, and context differentials. How do we, as mathematics teachers and educators, frame and generate the

meaning of student empowerment? How do we empower the students and how do we evaluate and identify empowered conditions of students in the mathematics classroom? Answers to these questions are emergent. Considering the mathematics classroom scenario, student empowerment concerning teachers' beliefs, power-empower perception, and practices in mathematics classrooms 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 based on student empowerment. So, the combination of the cognitive and affective domains that associate students' empowerment became the emerging and curious area that this paper attempted to explore in the context of mathematics classrooms in Nepal.

Students Empowerment: A Glimpse

The assurance of voices and participation of students in mathematics learning in or outside of the 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 are 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 a good classroom environment is the key concern these days. In the mathematics learning realm, other than spiritual, political, and economic strength, empowerment (Thomas & Velthouse, 1990) develops confidence in students and enhances their capacity to do mathematical activities in the classroom. Empowering students is not only a major motivational factor in the academic arena but also redefine mathematics teachers' role as a professional helper through the use of empowerment-oriented language (Rappaport, 1981).

Moreover, unequal recognition of students' first language, world view, sociocultural background, life struggle, and knowledge status (Kaur & Hoe, 2017) may hamper the empowering condition of the students. Ultimately, empowering students in the 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 the mathematics learning process has become emergent.

Context Generation

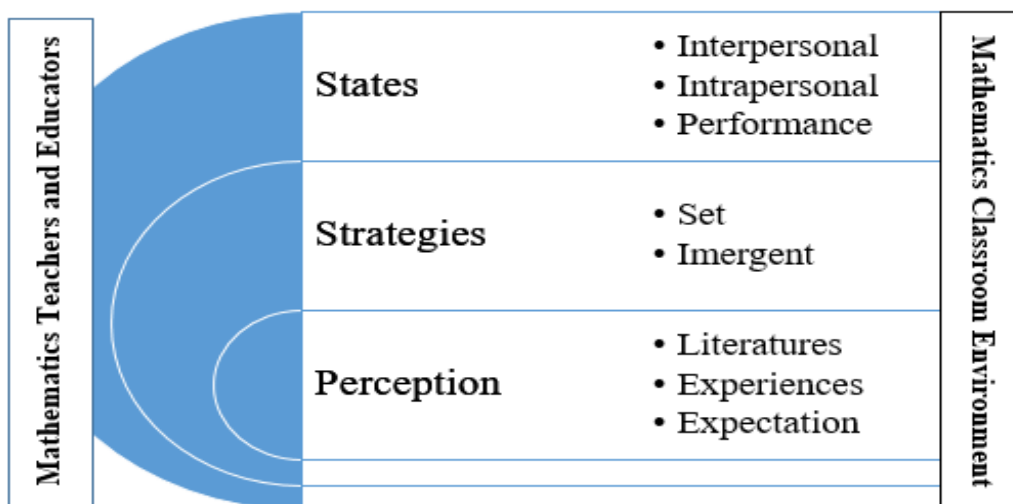
Empowering students in the mathematics classroom is not an objective process. Empowered students depend upon the content, context, experiences, rationality, and knowledge of it. Observation of identifiable students' behavior and their phenomenological strength and discourses (Bell, 1978) on it would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

Here it is argued that the subject of empowering students and its impact on learning mathematics education has not been fully studied yet. Mostly, in a mathematics classroom in Nepal, research studies are based on cognitive goals oriented which may not be sufficient to empower students. So it is better to add through an affective domain approach and its practices in mathematics education for the students' empowerment. Motivation, feedback and reinforcement, encouragement, and attraction to 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 visible behavior changes (Grootenboer, Lomas & Ingram, 2008) as the students' empowerment in the mathematics classroom, so that higher achievement in mathematics is possible. Similarly, when I used to teach mathematics, I experienced that there was a lack of establishing/re-establishing relationships, trust in mathematics teachers, and acceptance of students doubting constructively. Thus, how is student empowerment perceived in the mathematics classroom? Do you, as a mathematics teacher, 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.

Framing the Focuses

The main purpose of the research was to explore the understanding of students' empowerment, strategies and motivating behavior observed in the 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 an external connection of student empowerment rather than a mathematics classroom. It also supported me to avoid 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 the crux; strategies are in the middle core and state is as outer part. All these interacted with mathematics teachers and educators to make the meaning and fulfill the research objectives. It was fully discussed based on the mathematics classroom boundary of community schools in Nepal.

Figure 1: Framework



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

Strategies. What rules and strategies were practiced to empower students in the mathematics learning process? This was focused on 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 were taken as more precise than perception. These strategies would be already set in legal documents or developed by the school management committee or through the classroom code of conduct. Interdisciplinary empowerment strategies were taken as the set strategies. In another 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 on the 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, an 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 thought and believed that empowering processes and outcomes vary from respondent to respondent in all contexts.

Methods

This article is a supplementary inquiry to add to the full issue of teachers' power and students' empowerment in the mathematics classroom. Perception and understanding of students' empowerment, strategic rules, and state of being empowered in mathematics classrooms were captured using an explorative qualitative approach. Being subjective, plurality, and contextual issues, it was supposed that there is multiple reality in the interest of the area.

Permanent mathematics teachers from community secondary schools within Kathmandu valley are the key informants to gain the perception, strategical practices, and insights toward the state of students' empowerment in learning mathematics. Purposive sampling was applied to select the key informants. This sampling method was possible in my research due to personal contact with those mathematics teachers because most of them were my colleagues. Likewise, my research supervisor also supported me to choose and contact them as my respondents. At the final stage of this article, there were only four mathematics teachers as my key informants and many more supporting teachers who gave intense and new ideas to prepare this article. The semi-structured interview guidelines (see

Annex A) were prepared for the mathematics teachers. For the follow-up, I used a messenger group. In addition to that, the pandemic benefitted me to make use of the mathematics teachers who have blended knowledge of physical classroom teaching-learning practices and virtual practices.

I physically visited each of my respondents with pre-information. Oral consents were sufficient for me to go ahead with data collection and I ensured them that the responses are confidential and used only for academic purposes. To collect data, I simultaneously have been used e-mail and messenger to respond to the questions in written form. It was informed about research objectives, requesting them to support utmost, and fill free to response in emic and etic points in a paragraph within their possible date of response. I collected their responses after many informal conversations and follow up. It was going parallel for up to three months to collect optimum responses and their analysis. It was a descriptive exploration of the phenomenon. Thought units were separately transcribed for categorization, memoing, and keynotes were used in reflection and analysis. Once a draft of the interpretation was made, it was resent to the respondents to add, modify, and reduce according to their intention of saying. Several virtual common discussions and one-to-one discussions were made which supported to make the meaning of students' empowerment in the mathematics classroom. Furthermore, it helped me to derive the results and insightful discussion on empowering strategies and their practices in our mathematics classroom and assessment of empowered conditions of the students.

Results and Discussion

A descriptive interpretation of key focuses is made in this section. Different views of respondents, keynotes and researcher's reflection, and the literature are combined under separate subheadings; perception of students' empowerment, strategies of students' empowerment, and the states of empowerment. The pseudo-names of my participants were used in the explanation of desired focuses.

Perception of Student Empowerment

Answers to the question like, how do we make own views towards student empowerment in the mathematics classroom, can be captured from different subjective dimensions. Here, I delimited them to mathematics educators' and mathematics teachers' experiences and beliefs, fundamental pieces of literature, and classroom contexts. Bijaya, one of my key informants perceived that;

"A process of making encouraging, participating, motivating, and interested students toward learning mathematics is students' empowerment. The state of enjoyment, fun, and devotion to doing much better in the subject matter is also the students' empowerment. There should be smart work rather than hard work in the solution of the mathematical problem to empower students."

He further added that "...empowerment is the strengthening students' voices and participation in classroom decision and activities..." Gopal, as mathematics educators put his additional views on understanding student empowerment making a positive classroom environment so that students feel safe and collaborative, is the learner's empowerment. According to Shekhar, students' empowerment in the mathematics classroom is;

"Making motivated students toward learning mathematics and students' readiness to engage in mathematical activities is the students' empowerment. Enhancing thinking, reasoning, and

logical capacity in learning and accepting mathematics is the students' empowerment. Active participation with leadership interest in doing mathematics activities is also termed as the students' empowerment."

Shekhar made the common consensus that the state of mind and body in which students are always ready to take part in 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 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 the classroom environment rather than "to give power to" (Thomas, & Velthouse 1990) is the value-laden understanding of students' empowerment in mathematics education.

Strategies for 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 be ineffective teacher's position. It is believed that no single standard fully captured and support empowering students in mathematics learning through connecting process and outcomes for all students in all contexts. Consultative virtual interactions, and written responses linked with available references, I realized that it is difficult to sort the fixed strategies to empower students in our mathematics classroom. One of my informants Reetu (pseudo name) madam told that,

"Primarily mathematics is a more difficult and monotonous discipline in the academic field. No learning in mathematics without active participation and only internal motivation leads them to active engagement in classroom activities. A teacher needs to do enjoyable acts to attract students like telling jokes and have to link every mathematics act to students' real life. So that students will be interested to learn mathematics"

According to Reetu madam, the strategies of participation, engagement, and motivation to the students are in higher order. At the same time, mathematics teacher has to make an enjoyable classroom environment to empower students towards learning mathematics. She added that the classroom discipline rules developed by school management and teachers are sufficient for me as stated by Reetu madam. In the FGD session, it became common to all participants and me as well that some additional ideas would be necessary to address the more introverted and self-efficacious students. Similarly, it was convinced that mathematics teachers must play that role which extinct the undesirable behavior 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. According to him;

"What we learned in 9-10, does not work in the recent mathematics classroom. We are preparing our best for to smooth and effective delivery of content. Preparation of slides, use of

ICT, training of different software like Geo-gebra, zoom meetings, etc are our weapons to improve teaching-learning."

Participants subjectively summarized the proper use of learning theories and pedagogical approaches of making empower students in the mathematics classroom. One interesting strategy to empower students has been practiced and be better practiced by mathematics teachers was highlighting the importance and connection of mathematics education to the study of same grades other subjects like computers and science. Moreover, the mathematics educator Bijaya emphasized that teachers can motivate and empower their students in learning mathematics by connecting the importance of mathematics education for higher study and the impacts of mathematics education beyond the school premises. Once Bijaya noticed the empowering strategies by the Science teacher and he also tried that in the mathematics classroom and found it impressive. In the real practices of empowering students in mathematics learning, Bijaya made his statements as follows;

" I make it compulsory to do the project work, home assignment. Sometimes I was forced to do classwork for the underperformer students. Project work and its presentation are enforced in my class. I controlled those students who show misbehavior and unnecessary talk in the classroom. I never used physical punishment but frequently counsel them."

According to Bijaya, we as mathematics instructors have to focus on classwork, project work, group work, and presentation as additional ways of empowering students. Externally, maintaining equity (Tutak, Bondy & Adams, 2011), balancing equality, recognition of students' cultural practices, and 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 the latest technologies to the students in the classroom increases their interest and make them ready to learn mathematics effectively. Equity treatment as suggested by Tutak et al. (2011) in the classroom helps to improve the individual relationships with the students. Some of the participants have been focusing to empower their students in mathematics learning through the strong application of mathematics education to investigate and challenge injustices and inequities that 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 the classroom to develop students' knowledge and skill in mathematics education as the empowerment technique. We, as mathematics teachers, have to give positive feedback to the students who have lost their motivation in learning mathematics, which would be the common strategy for empowering students. Along the line of Acharya (2015), we have to use the strategies of individual communication and care to handle diversity and support to develop critical mathematical thinking in the students. Mathematics teachers need to avoid micromanaging their students as claimed by Broom (2015) and have to gradually build students' capabilities so that students are in self-control and their choices are their own in mathematics learning. This helps

students to build their confidence in mathematics learning processes and ultimately results in empowered students.

States of Student Empowerment

How we know and ensure that the mathematics learner is in empowered conditions, is the main concern under this subheading. The state of empowered students is mostly a physio-psychological aspect. As a result of the meaning and understanding of students' empowerment in the mathematics classroom of my participants, the application of various empowering strategies on students, and my reflection, we agreed that there is still difficult to capture the empowering conditions. The mathematics teacher Suman used to evaluate his student's 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 are 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 sir. We can observe the position and situation of a classroom with sufficient collaboration and cooperation for the state of empowered students in learning mathematics in the classroom. Gopal sir has been noticing disempowered students in his classroom. He realized that when students lack classroom discipline and enjoy off-task behavior, then it would not be a motivated state for them. How do you build the teacher-students and student-student relationship in the mathematics classroom? Its characterization (Kirk, 2012) would be the notion of empowerment. Poor attitudes toward teachers, content, and knowledge make students apathetic. Consequently, they lose their confidence in learning mathematics and are in disempowered conditions. Thus, overall students' behavior in the mathematics classroom would be evaluated to identify the state of an empowered student or not. Mathematics teachers have the challenge of the unpredictable and dynamic behavior of the students. In that situation, the desired and observable behavioral changes that are accepted by Mangal (2017) would be also the notion of empowered students. Hence, as said by Houser and Frymier (2009), empowered students to feel more competent and more motivated to perform every classroom task. They assumed that they have an impact on their learning process in the mathematics classroom.

Conclusion

This is the explorative research article on students' empowerment in the mathematics classroom to address the issue of perception, strategies, and conditions of students' empowerment. It was carried on for in-depth insight into students' empowerment in the mathematics classroom, so an effective classroom environment and then real mathematics learning is possible. Empowering students in the mathematics classroom is an investment through which students' potentiality in mathematics learning and achievement can be examined. Not only this, critical thinking opportunities and self-confidence in mathematics learning will be developed in the students. By the above discussion, students' empowerment in the mathematics classroom is subjective, value-laden, and contextual to mathematics teachers and educators. It energizes students to do all mathematical activities and take on their roles and responsibilities. The process of building confidence in students toward mathematics content, knowledge, skills, cooperation, and collaboration is termed empowerment. Employing equity treatment, providing sufficient opportunities for engagement and

participation, unleashing the student's potentiality, individual creative feedbacks, inter and intra link of mathematics subject, proper and efficient utilization of available resources, inspiring and role models like the appearance of mathematics teachers and more are the basic strategies to empower students in the mathematics classroom. Empowering student is an everlasting process in the mathematics classroom but the state of empowered students has to identify and do accordingly. Mood, behavior, and presence of individual students in the mathematics classroom play a vital role in making the classroom environment. An effective domain like procedures needs to be well evaluated during teaching and learning mathematics to ensure a 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 empowerment of students. Overall discussions, information, views of informants, and reflection showed that understanding of students' empowerment in the mathematics classroom is more similar and convincing. Similarly, not-so-deviant meanings and perceptions toward students' empowerment were made by key informants that are available in the pieces of literature. However, there is still lacking policy, regulation, and practical strategies for student empowerment in the Nepalese mathematics classroom. Moreover, there is a gap between set and expected empowering strategies and their real application in the classroom.

Implications

There was curiosity that remained not only in mathematics teachers and academicians but also in the policy maker, planners, 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 research would be a milestone in improving our mathematics classroom through the real-time practices of varied empowering strategies for better learning mathematics. Research showed that there is a lack of policy, regulation, and practical strategies for student empowerment in the Nepalese mathematics classroom. So, it is the right time for policy addressing. Similarly, our effort is necessary to reduce the gap between perception and expectation of empowering strategies and their real-time practice in the mathematics classroom to enhance mathematics learning. It opens a new area of quantitative research in the effective mathematics learning environment to ensure higher aspiration in mathematics education through the selected predictors. Varieties of supporting blocks of students' empowerment are discussed in this article to build a 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 type of pandemic, natural disaster, and instabilities.

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