

Challenges Toward Learning Mathematics

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Abstract

Mathematics is the science of all sciences and the art of all arts. Mathematicians had been concerned with everyday problems. However, today's students are uninterested in learning mathematics. My research is based on narrative inquiry and the interpretivism philosophy paradigm. The main objective of this research is to identify students' challenges to learning mathematics. I gathered information from eight participants from two schools, one public and one private. To achieve the research objective, in-depth interviews were conducted with research participants. I had narrated views about perception and challenges towards learning mathematics from my participants. After analysis and interpretation of data, challenges towards learning mathematics were mathematic anxiety, lack of interest, negative perceptions, lack of students labor, present practice of teaching and unqualified and nonprofessional teachers, traditional teaching methods with rote learning, lack of parents awareness, low socio-economic status of parents, low self-efficacy, lack of motivation and counseling, low self-efficacy of students, unpractical curriculum and courses, poor school administration and physical facilities, math myth. Public school students and non-optional mathematics students had faced more challenges than private school students and optional mathematic students.

Keywords : Challenge; Philosophy; Mathematics; Learning; Narrative; Perception; Math anxiety

Introduction

Around the world, mathematics is a crucial subject. In Nepal, all schools must offer mathematics as a subject. For both daily life and advanced study in the sciences and technologies, mathematics is crucial. Every discipline makes use of it. No discipline can progress without mathematics (Acharya, 2017). So, according to Burton (2003), mathematics is the "queen of science." Mathematics is an important subject that has been accepted as part of formal education since ancient times. Nitisha (2018) argued that ignorance of mathematics harms all knowledge, as it prevents one from knowing the other sciences or the world.

Mathematics is essential for lifelong learning and technical practice, enabling students to find jobs and be successful in the labor market. Modern teaching methods can influence student interest (Hodanova and Nocar, 2016) Singha et al (2012) claimed that 60% of Indian students consider mathematics to be complex, and 80% of mathematics teachers believe that their students have a negative view over mathematics. Moreover, Khanal (2015) argued that mathematics students in Nepalese secondary schools have difficulty understanding,

investigating and generalizing the mathematical situation, leading to a high number of students failing in mathematics examinations. In the context of Nepal, a significant number of SLC students drop out or fail in mathematics. The level of achievement and scores in mathematics lag behind those of other subjects (MOE, 2015). Additionally, according to a report by the Education Review Office (ERO) in 2013, SLC dropouts encounter difficulties in Mathematics, English, and Science. The statistics further reveal that the failure rate in mathematics stood at 29.62% in 2010, escalating to 38.79% in 2011 and reaching 42.09% in 2012. These figures clearly demonstrate that a considerable proportion of SLC students struggle to succeed in mathematics. Another ERO report in 2017 disclosed that the average grade VIII mathematics score had declined from 50.8 in 2015 to 49.2 in 2017. Year after year, there is a downward trend in math learning achievement. In fact, 59% of students perform at or below the basic level in mathematics, indicating a low level of competency. Furthermore, as per the ERO (2019), less than 32% of students meet competency in class 8. The report also highlights a significant proportion of students underperforming in school-level education, particularly in mathematics. The failure and dropout percentages in mathematics surpass those of other subjects, reflecting a general indifference towards learning mathematics. These issues necessitate an in-depth study of the factors contributing to students' indifference towards mathematics learning. The performance of students in mathematics during the School Leaving Certificate (SLC) examinations is disheartening, evident from the average score of 27.57 and a pass percentage of 41.21 (Ghimire, 2010). According to Rameli and Kosnin (2017), students' performance in mathematics is a significant concern within mathematics education. However, many students perceive mathematics as a challenging subject to grasp. Factors such as students' attitudes, interests, and teaching methods contribute to lower academic outcomes and students' indifference towards learning mathematics, highlighting the influence of students' perceptions on their approach to the subject (Jumadi & Kanafish, 2013). The way mathematics is perceived by students is crucial for effective learning and teaching. The school system, family background, and students' overall attitudes towards school collectively shape their

perspective on mathematics (Pontian, 2019). Perception plays a pivotal role in mathematics learning, as it influences students' indifference or engagement in the subject. Lamb and Fullarton (2002) examined interconnected factors that impact mathematics teaching and learning, encompassing personal, classroom, and school-related elements. Personal factors encompass beliefs, attitudes, readiness, and willingness to learn. Home factors include socioeconomic status, parents' educational background, and occupation. School factors encompass aspects such as the physical environment, availability of learning resources, and teaching and learning strategies.

Joshi (2017) found that most students had a favorable attitude toward mathematics. However, they encountered a number of difficulties, such as lack of confidence, math anxiety, inadequate guardian qualifications, unfavorable home environments, social discrimination, a lack of qualified teachers, a lack of teaching materials, and a lack of essential physical facilities. These elements have a big impact on how students feel about math. In light of the aforementioned perspective, the main focus of research is on why students lack interest in mathematics and struggle to learn it, as well as the challenges they face.

Panthi and Balbase (2017) used their research to shed light on the teaching and learning issues surrounding mathematics education in Nepal. They identified several factors that influence teaching and learning, including social and gender issues, achievement issues, cultural factors, and technological challenges. Addressing these issues is critical for promoting effective teaching and learning practices that lead to improved mathematics achievement. Another study, conducted by Rustom and Remali (2016), looked into the difficulties that students face when learning mathematics. They identified several factors that contribute to these challenges, including self-related factors (negative perceptions and self-regulation), teachers (behaviors, practices, and characteristics), parents (limited cognitive, emotional, and financial support), friends (negative attitudes, behaviors, and lack of support), and other factors (the nature of mathematics and assignment pressures). Moreover, the challenges towards mathematics range from pedagogical, social, economics, administrative and policy aspect to

attitudes of students' and teacher's competence of teacher and teachers learning process. (Pia,2015). Challenges are the obstacles they encounter in their daily math learning, whether they occur in or outside of the classroom. Students who believe math to be too difficult and confusing to learn will undoubtedly lose interest in and motivation for the course.

Although there have been numerous studies on mathematical achievement, anxiety and attitudes toward learning mathematics in quantitative way. Qualitative approach is a systematic, subjective, used to describe life experience and given them meaning as well as context (Alreshidi,2016). Those researches tried to deeply analyze the participants' pain, pleasure, and experiences towards learning mathematics. hence, there is a scarcity of qualitative research in Nepal on the challenges that students face when learning mathematics from elementary school to university level. Given this gap, the objective of this study is to explore the challenges that students face when learning mathematics using a qualitative approach.

Methods and procedures

This study employed an interpretative research paradigm with a qualitative approach using a narrative research design to analyze the participants' experiences, pain, pleasure, and attitudes towards learning mathematics (Creswell, 2007). Purposive convenience sampling was used to select eight students from two schools, with four participants from each school. The researcher established contact with each participant, introduced the research proposal, and conducted in-depth interviews.

During the interviews, the researcher took notes and recorded the conversations with the participants. The interviews were transcribed, coded, and used to construct narratives regarding the participants' challenge towards learning mathematics. The data was categorized, compared, and analyzed descriptively to gain meaning in relation to the research objective. The research was conducted with care and respect for the participants, creating a friendly and relaxed environment during the interviews. Pseudo names were used to protect the participants' privacy. In the same way, to

maintain quality standard, I used trustworthiness and authenticity.

Results and Discussion

The purpose of the study was to investigate the challenges in learning mathematics. The study's findings were presented as narratives, and the data was gathered through interviews with students. Eight student narratives were examined and compared in order to find common themes in each student's understanding and experiences with the challenges of learning mathematics.

Bhagwati's Story

On May 4, 2022, I engaged in a meeting with Bhagwati to delve into the objectives of the present study and establish the interview protocol. During our discussion, I requested her to candidly share her personal encounters with the process of learning mathematics, Bhagwati conveyed, "The challenges towards learning mathematics are First thing is that I don't like my mathematics teacher because if I ask any questions, he used to get angry very fast. Secondly, I can't remember the formulas. The other problem is that there is no one to teach me mathematics in my home if I come across any problem while solving the problems at home. In the same way, my teacher doesn't explain properly while solving the problems. His nature is also not very supportive. While I was in class 8, I

got 60 marks in mathematics, and all my teachers congratulated me for doing well in the math exam but my math teacher didn't show any response. Our teacher comes to our class and while solving the problems he just explains once and that is why we can't understand properly. Likewise, whenever I make any mistake, my teacher scolds me and that discourages me. I want my math teacher to teach me more understandably. Similarly, our teacher makes different groups in the class based on the grades which also makes me discouraged and unhappy. In class 6,7,8, there used to be various interactions between me and my teachers but in classes 9 and 10, my teacher does not want to interact with the students and there is no strong communication between me and my teacher". We discussed the application of mathematics. She said,

"Mathematics is a practical subject that is useful in everyday life. It is used in stores

and the business sector, and my favorite school subjects are Social Science and Nepali. In mathematics, formulas must be remembered, whereas in other subjects, the meaning must be understood. I believe mathematics is boring and irrelevant to their daily lives". Then, we discussed home and social sources related to mathematics. She said, "Mathematics required more understanding and time but I had no sufficient time to study and practice mathematics at home because my fathers and mother are farmers so, I had to help my parents while they were busy farming. My brother and sister are also small, and I have to look after them and there is also a shop in our house so, I have to be at the shop to help with the calculations. My father and mother are uneducated; they can't help me to solve the problems I face while doing homework in mathematics but they encourage me to read mathematics. After I complete all my works, I read mathematics at night and complete all my homework at night. My parents provide me sufficient teaching materials to learn mathematics. Likewise, when my parents don't have enough money and they borrow with others to buy me materials required for calculations. I borrow my friend's materials for calculations. All this makes it difficult to learn mathematics at home".

My research participant bhagawati argued that main challenges towards learning mathematics were teacher's behavior and teaching learning strategy. She couldn't remember formula which is also challenge of her. Her challenges are no one teach her in home, not having sufficient time for learning mathematics due to household work. In fact, her main challenges towards learning mathematics were teacher behavior with teaching methods, design of course and her home environment. In the same way, she obtains low mark in mathematics, because of that, she got frustrated, so her frustration is another challenge towards learning mathematics. She feels that mathematics was difficult and uninteresting subjects, so she had math anxiety. Hence math anxiety was another challenge to her towards learning mathematics. She shares that mathematics course hadn't logical and practical, due to the course, she feels mathematics was

difficult. Not logical and impracticable course was another for her to learn mathematics. In the same way, Low self-efficacy and negative perception was also challenge towards learning mathematics.

Pawan's Story

It was April 14, 2022, I fixed the time to meet another respondent of this study, Pawan Adhikari. We discussed challenges toward learning mathematics.

He said, "math subject is not an interesting subject. We need to rote the formulas. I asked him if he had any experience of his math teacher not being able to solve the question during his class and left the class without solving the question. He said, Yes, it was the day before the exam and the teacher was solving one question of theorem but couldn't solve the problem and left that question. He tried a lot to solve it but he couldn't solve it. Unfortunately, the same question appeared in our exam and we couldn't solve it. We shared this with our teachers and they told us not to worry. when I asked, "Why did you select optional mathematics in grade nine? Is there are pressure from your family and your society?". He replied, "Yes. My teachers and parents recommended me to choose optional mathematics and all of my friends have chosen this subject but now I feel math is a difficult subject."

In pawan story, his parents and teachers had force to learn mathematics. Due to pressure, He feels mathematics is a difficult subject, so lack of suitable motivation was the main challenges towards learning mathematics for him.

Sabina's Story

It was April 17, 2022, I made a phone call to another participant, Sabina. we discussed challenges towards learning mathematics for her. She said, "I don't understand the way my teacher teaches us. Similarly, frequently changing the school also brought some difficulties while learning in a new environment. Memorizing the formulas also seem very difficult for me so, I feel mathematics is a hard subject". Moreover, she said, "My score in mathematics was satisfactory previously but it is not satisfactory now and I just obtained pass marks. I completed nursery to 4th grade in Kathmandu. There was a good environment and I used to

obtain 1st, 2nd, and 3rd positions after that I used to be counted among the top 10 students in the first school where I enrolled from grade on and 15 in another school where I enrolled from grade 5. Due to the change of school, I used to get low marks in math, and my interest also got decreased in math's and that's why I feel mathematics is difficult. The teacher did not give basic ideas about the concept of the topic so I could not understand the lesson well. Math would have been an easy subject if I had practiced a lot but I couldn't be able to pay attention to math subjects."

From Sabina's story, her challenges towards learning mathematics were, she doesn't understand the teaching way of the teachers, less practice of mathematics problems, change of schools, not having good school and home environment, impractical course and math anxiety.

Sunima's Story

It was April 25, 2022. I called the next research participant Sunima Gurung. We discussed her achievement in mathematics. She said that "Up to class 6 I achieved good marks in mathematics but after that math's seemed difficult for me. My mathematics scored decreased due to changing a lot of schools, and also because of the change in the environment". We talked about her interest in learning mathematics, she said that, "Up to class 6, I liked to study mathematics but from class 6, I didn't like mathematics because our math teacher got changed and I didn't understand how our new teacher taught us. He was not that good at explaining. It is also difficult for me to memorize the formulas. Then, I felt math was a hard and boring subject". Again, we discussed about school. She said, "My teachers never give us any extra material for solving the mathematics problem. Similarly, I didn't even know the answers to simple questions and I ask my friends and they help me with the problems. But I find it very difficult to ask questions to my teachers because I am scared of them. I was close to my

teacher in class 8, I was interested to read math and my teachers also used to support me while reading mathematics, and that time math was interesting for me. I also used to get good marks but in class 9, my math teacher got changed and my interest in mathematics got decreased. Now, I don't like

mathematics and it is hard for me. Likewise, I don't like the way of teaching of my teacher. Most of the math teachers are strict and the students are scared of them so, students don't like mathematics. We also discussed her home and society. She said,

"My father died when I was small because of that I had to support my mother, so I didn't have time for reading properly and it was difficult for me. My mother inspires me to read mathematics but my mother is uneducated so, she can't support me to learn math. My mother provides me money for my examination and other fees and even if she doesn't have one, she borrows the money from others for paying my fees and buys materials required for mathematics".

Sunima views, to challenge towards learning mathematics were math anxiety, low mathematics achievement, low socio-economies status of parents, teacher and her teaching strategy.

Santosh's Story

It was April 15, 2022. I took the time of another participant, Santosh Bhattarai. By maintaining social distancing, I took the time to meet him near his house in the park and discussed his interest in learning mathematics. He sincerely answered "I like mathematics, it is interesting because solving mathematics problems is such fun. In our school, there are two types of subjects as optional. They are optional mathematics and language subjects. I am good at math but I am weak at language subjects, so I took optional mathematics. Solving mathematics problems is very fun and I enjoy solving a mathematics problem than reading other subjects. I asked about the application of mathematics with him. He said "mathematics is an applicable subject. I like mathematics but I don't know where it is used. I want to learn mathematics and I am learning mathematics just because solving the problem is fun but I don't know where it is used." It means he is good at mathematics, He liked mathematics just because solving problem fascinates him but he didn't know where it was used in daily life. We discussed whether mathematics is an interesting subject or a boring subject. again We also discussed the challenges towards learning mathematics then he said, mathematics is all about practice. A very intelligent student also can fail if the student doesn't practice it properly. Once,

there was my mathematics exam and I hadn't revised anything then I went to give exams and I couldn't attempt the questions properly. That day I realized that regular practice is very important in mathematics. and my teacher gives us interesting questions and also give us tough questions and organize competition in the class which is so much fun. Sometimes in our class, whenever my friends make any mistakes, he counsels them. Our teacher only punishes the students if they commit a big mistake otherwise, they counsel us. And when the teacher punishes us I become really scared. Similarly, while teaching teachers don't tell us how and why the formula is applicable there rather, they only teach us the rule. I was scared of the teachers and now also I am scared of my teachers that's why I don't ask any questions to him and no one asks the questions to teachers because they too are afraid. Moreover, my teacher teaches us the formula and gives one example but he never explains it in detail".

From Santosh's story, He has a positive perception of learning mathematics. His main challenges towards learning mathematics is his teacher and his teaching way and impracticable mathematics course.

Manish's Story

It was April 13, 2022. I met a wonderful boy, Manish Pokhrel . I had already told him about my purpose for the meeting. He gave his perception of mathematics like a story. First of all, I asked him about his experience in mathematics till now and his achievement in mathematics and he said, "There is nothing as such but it depends upon how you practice mathematics. I always got over 90 till class 8 but in class 9, I got fewer marks but now in class 10, I always get over 90 marks and I am very happy." Similarly, we talked about the application of mathematics in daily life. He said, It is used to do the calculation in the shop. I use them when I buy books and ask for discounts on them. Once my teacher gave us one problem to solve in the class. I also started doing it. At first, I got wrong then I got right after doing it again and again and it felt interesting. I like mathematics because it can be used in the future if I choose a career in science or computer. I asked him about the challenges and barriers that he had faced while learning mathematics. He said, Once I was

confused while doing one question and I asked my teacher. Even she got confused and told me that it is not important so there is no need to study. Also, once while solving one problem, we found two methods for solutions one was from the book and one was from the solution solved by the teacher. So, we also got confused about which way to follow and this happens most of the time. When I ask my teacher about this, I don't get a proper answer. Again, I asked him, "Is mathematics an applicable subject?" He said, "Yes, it is. Now, we don't have much use but, in the future, it will be useful to us. As I already said that it can be used in shopping, banking, etc. Even my mother, my grandfather uses general mathematics though they are not so educated." After that, I asked him about the influence of home and society while learning mathematics. He said, "my parents think that I can do best in mathematics. I also get motivation from my teachers and my parents I if score good marks in exams." We discussed the challenges of learning mathematics. He said, "Concept should be cleared by the teacher but most of the time we are confused because of lack of concentration and also due to laziness. But this challenge can be solved by the teacher by teaching us in practical, clearer, and effective ways to clear the concept."

Manish's success in math, interest in learning math, good home environment, and self-efficacy have contributed to his positive perception of learning math. His main challenges are unqualified instructors and unreasonable course material, as well as the current approach to instruction.

Abhishek's Story

It was April 14, 2022. I scheduled the time for the interview with Abhishek . I had already told him about my purpose for the meeting. So, we began our conversation about challenges in learning mathematics. In class 6, he got 60 marks in mathematics but his marks were lowered in class 7. He scored low marks in class 7 because of the change in school. But after class 8, he got back to his previous school and scored good marks. We discussed his interest in learning mathematics. He said: I like math with logical questions. It is fun but I don't like questions that require more formulas. Similarly, while solving any sort of problem if it gets right in the first attempt then it becomes interesting but if it becomes wrong, it

seems boring. When I was reading mensuration in class 10, my teacher and my opinion didn't match while solving a problem because we had different ways of solving it and I felt that the way I solved it was easier. We discuss the challenges to learning mathematics, as well as the response of teachers and his score in mathematics. He said that "challenges and barriers to learning mathematics, such as not being able to focus on math subjects, not being able to read things that are not applicable in real life, and not wanting to read things that are not applicable in real life, teaching strategy of teachers, such as following a long way to solve questions and needing time to explain well". He said that my teacher encourages me; he tells me to study well. He inspires me if I don't know how to solve a problem, if I attempt it then he gives me at least some marks to encourage me rather than leaving the paper blank in exams. She tells us to practice more. She pays attention to the weak students which is encouraging. Lastly, we discussed the challenges and barriers to learning mathematics. He said, many students skip the questions which they feel is hard. They only practice those questions which can be solved easily. This is because many of us can't ask the questions of our teachers freely. We think our teacher will scold us for not paying attention but that is not the truth. Even if we pay full attention, some questions are really hard to understand. I think many students don't study mathematics because their seniors scare them telling them that mathematics is very hard and this also discourages them. Similarly, some students are also students are lazy too and they don't practice a lot. I think more students can learn mathematics if the teachers teach practically. Moreover, my parents also provide sufficient teaching materials for me. There is also a disturbance because of my friends and family when I spend my time enjoying with them and concentrate less on my studies.

From abishek story, his main challenges towards learning mathematics was mathematics classroom. Similarly, other challenges towards learning mathematics are: unqualified teacher, teacher's teaching way, nonlogic, unconstructive and impractical course are main challenges towards learning mathematics.

Kristina's Story

It was on April 17, 2022. I was looking forward to meeting one respondent of this study who is, Kristina Gurung. I started to discuss her mathematics achievement until now. She said that "Up to class 6, my mathematics marks were good but after class six my marks were that not that good and I just got pass marks. I feel bad for not achieving good marks in mathematics because my parents scolded me because of the poor result. Again, we start discussing her interest in learning mathematics. I don't like to study mathematics. I am not interested in mathematics. I feel that it is harder than other subjects. I don't understand mathematics. Similarly, I didn't choose optional mathematics in class nine because I felt taking another math subject would be very difficult for me, so I took environmental Sciences as an optional subject. I never received good grades in mathematics that is the reason why I felt that optional mathematics would also be hard for me. Then, we discussed the application of mathematics. She said that Mathematics is an applicable subject and maybe it can be used in the future but I don't know where it is used now. I like English and Nepali. I feel relaxed while studying these subjects. I don't understand the way my mathematics teacher teaches us. Most of the time, the concept is not clear to me and I get more confused. The teacher doesn't address our needs and interest. Our teacher

comes to our class, writes formulas on the board, solves the problem but they don't discuss with us while solving problems. Sometimes our teachers get confused while teaching and they solve that problem the next day. I like the teaching style of my social study teacher and the class is very interesting but the mathematics class is boring. My teacher doesn't teach in a group and there is no group interaction and discussion with the teacher and friends. Again, we discussed the challenges and barriers toward learning mathematics for her. She answered, "The main barrier is that our teacher doesn't motivate and doesn't give basic concepts of mathematics before teaching the topic." After that, we discussed her home and social source. She said, "I have sufficient time to read mathematics at home and I like to read in school rather than at home because my friends help me to solve problems while I am at school. My parents live

in Japan and no one can help me help in learning mathematics at home.”

In the same way, Kristina parents had good economic status but her parents had no educated and not conscious to her learning. That factor is challenge toward learning mathematic. She feels that mathematic was difficult, not interesting and unused subject. Hence, she had math myth about mathematic. Math myth was main challenge toward learning mathematic for her. Mathematic anxiety, low mathematic achievement, low self-efficacy, teacher and teacher learning strategy, not motivation and counseling about learning by parents and teacher, are main challenges towards learning mathematics for her.

Conclusion and implications

My research question was what the difficulties are in learning mathematics. Challenges related to perception, so in my study includes perception and challenges toward learning mathematics conclude to challenges. Non optional mathematics students had faced more challenges toward learning mathematics than optional mathematics students. In the same way, public school students had more challenges towards learning mathematics then private school students. Bhagwati, Sabina, sunima, Kristina and pawan challenges towards learning mathematics were teacher behavior, lack of motivation, current mathematics curriculum, low socio-economies status of parents. Bad teachers teaching strategy, low parents qualification, bad home environment, low mathematics achievements, mathematics anxiety, non-practical mathematical curriculum, low self-efficacy, poor school administration, class room management, lack of participants' labor, traditional teaching methods, present practice of teaching and math myths. Hence, those challenges develop negative perceptions towards learning mathematics. In the same way, Santosh, Manish and Abhishek face some same challenge of other my participants but they have less challenges to wards learning mathematics the other participants. Their challenges towards learning mathematics are lack of teacher knowledge about pedagogy and content, formula practice course, present practice of teaching. Moreover, Anxiety, lack of interest, negative perceptions, lack of labor, traditional teaching methods, parental awareness, low self-

efficacy, impractical curriculum, poor school administration, math myths, and undesirable society and culture are challenges to learning mathematics.

As a result, if concerned agency addresses those challenges and understanding student's perceptions towards learning mathematics then, students hadn't indifference towards learning mathematics. The number of students may be increase in mathematics subject in school level to university level.

This study assists educators, decision-makers, curriculum designers, and exporters in identifying the challenges of learning mathematics. These studies aid instructors in reevaluating their teaching methods. These studies aid in the rethinking of curriculum and educational policy by curriculum developers and school administrators. My research identifies challenges to math learning in various contexts, including the individual, the classroom, the home, and society. This study aids the concerned agency in understanding the challenges of learning mathematics and suggests ways to reduce them.

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