



FACTORS MOTIVATING THE DECISION TO MAJOR IN MATHEMATICS AT THE HIGHER SECONDARY LEVEL

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Abstract: *This study focuses on the “Motivational Factors for Choosing Mathematics as a Major Subject at Higher Secondary Level.” The objectives of this study were to explore the motivational factors of students choosing mathematics as a major subject and to explore the strategies of students majoring mathematics at higher secondary level. It is case study and qualitative in nature. One mathematics teacher and twelve students (six boys and six girl's) were respondents of the study which were selected through purposive sampling. Interview and Classroom observation was used as data collection tools during teaching learning activities. The collected information were analyzed with the help of theoretical and conceptual framework. The finding of the study shows that, the majority of students believe that mathematics is an easy subject from their childhood and that they are all proficient at it, obtaining a decent profession in the future is conceivable. Despite this, it is also seen that, there are not enough math students, this is because society does not place a high importance on math education. The number of mathematics students will rise if we introduce the new trend of thinking among students that mathematics is not a tough subject, it is an interesting one.*

Keywords: *Motivation in Mathematics, Major in Mathematics, Higher Secondary Mathematics.*

Introduction

The study of mathematics is crucial for students. Studying mathematics improves our ability to solve problems. It fosters more critical thinking and improved reasoning abilities. However, there are currently not enough students majoring in mathematics at the university level in Nepal. Since mathematics is frequently seen as one of the most difficult topics in school, the majority of students are less interested in learning it. Students find mathematics challenging because it always builds on prior knowledge, requires learning with understanding, and requires sufficient practice and patience.

A few students select mathematics as their subject because they enjoy it. When compared to other courses, students are less interested in learning mathematics for a variety of reasons. Among the several, the elements that foster a student's interest

in mathematics learning can be motivation, and it can contribute to the rise in the number of students studying mathematics as a subject.. However, the greatest approach to study is to major in mathematics because it offers a plethora of benefits over other disciplines.

Some students select mathematics as a major to be intelligent and distinguished, while others pick mathematics at a higher level as their subject of study in preparation for a career as math teachers. A few of the students decide to major in mathematics since they find it interesting. Due to family influence, a few students have chosen to major in mathematics. Numerous factors influence students' decision to major in mathematics such as liking of the subject, their favorite subject, economic considerations, math teacher, value of mathematics, the subject's

creativity, interest, foundation for other fields, prestige, social value, and high income.

Few postsecondary students worldwide are pursuing jobs in science, technology, engineering, and mathematics (STEM), according to a report (European Commission, 2004). Specifically, there is an exceptionally low recruitment rate of women in these fields (see for example European Commission, 2009). Because science and engineering play such a significant part in the development of contemporary civilization, meeting the demand for these professions is a global problem. At the same time, there is a global interest in creating a diverse and gender-balanced scientific workforce. Many research have been conducted in an attempt to determine what motivates and keeps students interested in STEM fields as a result of this circumstance (Brickhouse, Lowerly & Schultz, 2000; Herzig, 2004; Hill & Rogers, 2012; Medick, 2005). My work's primary contribution is to our understanding of the factors that influence students' decisions to major in mathematics. The present study aims to investigate: What factors motivate students to choose mathematics as a major subject?

Previous research suggests that higher level math's engagement is minimal. According to some data, majority of students are enrolled in higher-level mathematics courses. However, other evidence suggests that there is now little engagement in higher level mathematics. Thus, researchers investigated the problems and identified the driving forces behind students' decision to major in mathematics, a decision that is being made by an increasing number of students in upper secondary education.

Statement of the Problem:

Since the majority of school students struggle in mathematics, low accomplishment in the subject is a prevalent issue in Nepal. Few students chose mathematics as a major in the current school year. So, is it one of the reasons why there is a decline

in students interest in mathematics? Thus, researchers look for the driving forces behind students' decision to major in mathematics and investigate the experiences of those who are majoring in the subject at the upper secondary level.

From the dawn of human civilization until the twenty-first century, mathematics has been an integral part of existence. Its importance in both daily living and sophisticated scientific and technological studies. Not only in Nepal, but across the globe, , mathematics is the first subject taught in schools. But, few students chose mathematics as a major in the current school year. So, this is one of the problems? Thus, researchers look for the driving forces behind students' decision to study in mathematics.

Objectives of the Study

- i. To explore the motivational factors of students choosing mathematics as a major subject.
- ii. To explore the strategies of students majoring mathematics at higher secondary level.

Method and Materials:

The study is carried out through following research methods and materials.

Research Design

This study was based on a case study research design. The Ed-Mark College in Kalanki served as the research case. A case study is a kind of documentation used to examine how a certain individual, organization, or circumstance has changed over time. A case study focuses on the in-depth contextual investigation of a small number of circumstances or occurrences and how they relate to one another. This qualitative research approach has been widely used by social scientists in particular to analyze current

real-life events and serve as the foundation for the application of concepts and the expansion of methodologies (Yin, 1984). An attempt was made to comprehend the intricate link between the motivating variables for selecting mathematics as a major through this case study. In essence, the case study highlighted how students saw, interacted with, and responded to variables that motivate them in mathematics learning.

Sample of the Study

Ed-Mark College was selected for this study because it has a sufficient number of math students, which is necessary for the researcher to gather data. Purposive sampling dictates that there be six sample students for this study—six boys and six girls. For the purpose of gathering data, the researchers also conducted an interview with a mathematics teacher from the school.

Data Collection Procedures

the researchers collected concerned data and information with the help of a semi structured interview, and class observation form. we had recorded the activities of focus students and teachers in the classroom through class observation form. The interview was taken with the 12 students (6 boys' students and 6 girls students) and one mathematics teachers. The conversations were recorded on audio. . Focus points of the interview was motivational factors of choosing mathematics and to explore the strategies of students majoring mathematics at higher secondary level. (peer group discussion, assessment, self-study, practices etc.)

In this part, the researchers took in-depth interview of 12 students (6 boys and 6 girls) and one math's teachers of grade XII of case College of Kathmandu district.

Results and Discussions.

Motivational Factors of Choosing Mathematics as a Major Subjects

Motivational factors, which are related to the intrinsic character of the work but not always to the external environment or circumstances, have an impact on human behavior. A "satisfier," such as accomplishment, advancement, or responsibility, is referred to as a "motivational factor" when it motivates someone to work more and more efficiently. It is applied within the framework of the two-factor theory of motivation hygiene. The task itself, recognition, progress, autonomy, personal development, achievement, and accountability are all sources of motivation. elements that the case students talk about in the interview. The themes of creative topics, intriguing subjects, loving mathematics, and understanding one is competent at mathematics are now intertwined because of the nature of mathematics and the four main themes of motivating aspects that scholars describe.

Value in mathematics

The necessity for mathematics instruction in schools is supported by the subject's many educational advantages. These are sensible guidelines (mathematics has many useful applications). Everybody uses mathematics in every aspect of their lives. Regardless of our financial status, mathematics is a need for everyone. Value in society: The cultural value of mathematics is strong and has been growing over time. Mathematics has greatly contributed to the advancement of our society. It is valuable in terms of discipline (mathematics also trains or disciplines the intellect). It improves one's ability to reason and think. According to Locke, math is a method for instilling in the mind the habit of thinking. As a result, it is evident that mathematics provides a wealth of educational advantages that highlight the subject's increasing importance in the classroom.

The researcher paired their passion of mathematics with an intriguing and creative subject, realizing that certain issues naturally lend

themselves to mathematics due to its intrinsic qualities. The following responses were gathered from interview. Upon inquiring about the rationale behind selecting mathematics as a major, the students provided the following replies on the significance of mathematics.:

“Students think mathematics is an intriguing subject. They excelled at math more than other courses in school and majored in the optional subject. Some pupils claim that math is easier than other subjects. A few students said they had loved math since they were little. In high school, they decided to major in mathematics. They think math is easier than other subjects. They also asserted that mathematics is a creative discipline”.

The students' answers indicate that mathematics is a topic they find interesting, enjoyable, and innovative, all of which add to its value. The students seemed interested and excited about what they were studying when I peeked inside the classroom when the teacher was teaching mathematics.

Based on the aforementioned responses, it can be inferred that most students who choose mathematics as their major also think the topic is easy and are confident in their mathematical ability. Thus, the importance of mathematics serves as the main driving force behind choosing mathematics as a major. Constructivism by Vygotsky holds that people's ways of knowing are influenced by a variety of factors, including interaction, direct teaching, belief, language, reasoning, modeling, and past knowledge. Math classrooms employ Vygotsky's constructivism as a teaching framework. This means that when the teacher does the performance on the subject cautiously at first, the student freely executes it. It is found that, teacher first completed the puzzles before assigning the corresponding puzzles to the students. As a result, constructivism was used to teaching and learning activities.

Economic factors

Economics is the most important subject to promote math study among students. By assisting them in securing a reliable profession in the future, it is one of the subjects that helps individuals keep stable economic situations throughout their life. Some students simply replied,

“This is why I chose mathematics as my major,” when questioned. *“Future career achievement is aided by mathematics. Some pupils said that mathematics has a wide range of applications. Some pupils claimed that since there aren't enough math teachers, they study math to better their financial situation”.*

The responses of teacher about this as follows

“The teacher stated that math is crucial for the study of the IELTS and GRE for further study, which aids in increasing income. There is just one subject that guarantees employment in the future”.

It is concluded that math is important for pupils since it's one of the paths to a successful profession in the future. Finding work will be possible, and there are many of mathematical applications that positively affect our day-to-day financial circumstances. According to Vygotsky's constructivism, social contact is essential to the growth of knowledge. Children from affluent families engage with their instructors and peers in the school, but children from low-income families do not. They are in the classroom and in quiet mode.

Mathematics Teacher

Even yet, not every students enjoy math, with the help of an effective math instructor, students who have previously struggled with mathematics can begin to build confidence in their skills. Children who are not very interested in mathematics can be made to find the subject engaging by a skilled math teacher. A great math teacher makes the

classroom seem comfortable and friendly. Therefore, the mathematics instructor is one of the most important motivators for selecting mathematics as a major, since some students select the subject due to the teacher's influence. When researcher asked about the reason of choosing mathematics as a major one student simply responded that

“She claimed that her village lacked a wonderful math teacher. She came to Kathmandu from her hometown to pursue higher education, and she promised that one day she would be a great math teacher in her community. Another student simply remarked that there weren't enough math teachers, so he chose mathematics to become a good math teacher”. (Student's views)

When we visited the classroom, we saw that the math instructor and students were actively engaged in the instruction. The teacher engages with the students and walks them through each step as they solve the issues on the whiteboard. The responses above suggest that most students choose mathematics as their major in order to become highly skilled mathematicians. This is another factor that greatly encourages choosing mathematics as a major. Constructivism, as proposed by Vygotsky, holds that knowledge is formed when students and teachers interact directly. Interaction is therefore necessary for the collection of information. It is found that when participating in teaching and learning activities, teachers and students should stay in close touch.

Mathematics Learning Environment

The learning environment is constantly influenced by the teacher's behaviours. Both the decision of students to seek higher education and their academic achievement are directly impacted by the teachers's behaviour and consequent learning environment. A demotivating learning environment will cause students' interest in mathematics to steadily decline. Therefore, teacher need to be conscious on this phenomenon

and make an effort to add additional interest to the lessons so that student will motivate

Participants stated, *“Since mathematics is a challenging topic compared to other subjects, the teaching approach, which is consistently “teacher oriented” and not practical based, is not helping us maintain our interest in the subject. Instructors should be able to manage the classroom and make the most of it as they are in charge of all activities that take place there. However, some teachers choose to focus on their more gifted pupils rather than the ones who most need their assistance. As a result, strong students consistently receive the greatest assistance, while poor students consistently lag behind. In reality, when professors behaved in this way during class, weaker pupils like us became demotivated. Furthermore, instructors with diverse educational backgrounds do not receive any kind of teaching preparation. Teachers are viewed by us as role models, parents, mentors, and leaders. They are therefore responsible for the most. In order to carry out their duties, educators, parents, curriculum designers, and the government should all work to provide a welcoming and inspiring atmosphere for children.”.*

Based on the data, it appears that the classroom activities are demotivating them. The classroom management, personnel, and instructional methods are all unsatisfactory, so need to maintain it.

Job Opportunities

One important subject that came out of the interviews was job opportunities. To live a happy life, everyone seeks a respectable job with a good wage. People desire a simple living and bright future; therefore, they spend a large percentage of their income on quality education. Consequently, the chances for work begin to significantly influence students' decisions.

Most of the participants reported, “Our choice to study is determined by the prospects and high salary we can obtain. We have to make a decision that will ensure the security of our future, thus it is quite crucial. It implies that we must obtain respectable professions with lots of opportunity. As an illustration, the current trend indicates that there are many business prospects, such as managing hotels, restaurants, banks, furniture stores, and so on, all of which appear to contribute to the creation of more jobs for people. Because of this, these careers are seen by everyone as successful, fulfilling lives that people can look forward to.”. And I asked the participants during the interview why don't you want to study Mathematics? And they answered, “studying mathematics, there is no future. Moreover, we do not even know what kind of job opportunities we can get studying mathematics and we see there are limited options for us after finishing our studies. Whereas, we see a lot of opportunities out there, studying non-required mathematics subjects. For instance, in the field of Business, Health et cetera” As a result it can be said that job opportunities can be considered as a strong reason behind not choosing mathematics in higher study.

Foundation of other sector

Mathematics is one of the disciplines needed to study in professions like population, administration, engineering, and medical. Without math, none of the discipline can be studied. In addition, for everyday tasks and record-keeping, mathematics is a necessary.. Math-based strategies for preparing for the GRE and IELTS can help students to secure a coveted scholarship for further education. Several students mentioned that, when questioned, why they decided to specialize in mathematics, “Students said that mathematics helps to study in other subjects of other sectors such as engineering, science, management, population, rural

development etc. So, mathematics is important for us”.

Also, “Teacher said that it helps to study GRE, IELTS, which helps to get a good scholarship for further study. Mathematics also helps to compete for LSC which is the base for getting a government job”.

Therefore, it is concluded that mathematics is the cornerstone of study in many domains. Without mathematics, it is difficult to study science, engineering, management, population, rural development, etc. Thus, laying the foundation for future academic undertakings is one of the motivations to study mathematics.

The strategies of students majoring mathematics at higher secondary level.

The methods of students majoring in mathematics at the upper secondary level are defined as the act or process of adding to the body of ideas, attitudes, and beliefs. The collaborative method aims to provide novel insights or knowledge that surpasses individual capabilities. It is based on the ideas and principles of one another. Students who major in mathematics at the upper secondary level use different strategies depending on how supportive their teachers are in helping them comprehend, investigate, and identify mathematical knowledge and how constructed within it (Banks, 2002, p. 14). There are several strategies of students majoring mathematics at higher secondary level which are as follows:

Practice, Practice and More Practice. It is a status shared by students focusing in mathematics in upper secondary education. It is impossible to study the properties of math by reading or hearing. To learn building knowledge and math, we have to get our hands dirty and tackle some real problems. It's best to practice solving mathematical puzzles as much as possible. Since every issue has a different set of attributes, it is

essential to have many solutions for each problem before the exam.

The pupils' straightforward answers when I questioned about it, they mentioned that *“Mathematics is a practical subject therefore, the greatest approach to learn mathematics is to practice more. They advised putting what was taught in school into more practice at home as the strategies of students majoring mathematics at higher secondary level and the content cannot be learnt and constructed if we do not practice more frequently”*.

Upon observing the classroom, it is seen that the students were practicing the issue as the teacher was working on the white board. After that, the students try to tackle this textbook issue. The answers above lead to a conclusion that practice is necessary for mastering mathematics. Learning maths is beneficial. As a result, the best way for students to enhance their status in advanced secondary mathematics classes and major in mathematics is to practice.

Self-Study

Even if self-studying mathematics is challenging, analyzing one's own arithmetic mistakes is easier than analyzing one's own complex computer programs or English writings. The requirement that every step of a mathematical calculation or proof be written down so that we can understand it. When we questioned math students about their preferred methods of learning, they gave us straightforward answers that:

“Self-study is also important as the strategies of students majoring mathematics at higher secondary level,” the students stated. They claimed that it is crucial for people to learn mathematics alone at home otherwise mathematics cannot be learned”.

From the above comment, it is declared that learning a lot of theorems and mathematical concepts requires independent study. Learning by

oneself facilitates the acquisition of new mathematical information. Consequently, studying individually is one of the best tactics for students majoring in mathematics in upper secondary school. Self-studying learners need help with the apprenticeships they don't understand. Apprenticeships help students learn and support their understanding in areas where they struggle. Within Vygotsky's constructivism, apprenticeships are seen to have consequences for both teaching and learning.

Group discussion

In group discussions, participants ask a range of questions, each of them has unique ideas, perspectives, and methods of thinking. Group conversations allow a group of pupils to become aware of other viewpoints. It encourages creative problem-solving and doubt-reduction techniques. Mathematical group talks help students specializing in the subject at the upper secondary level develop in their studies, solve problems, and come up with novel solutions to time-tested problems. In group conversations, people share ideas and gain important knowledge from one another, which helps to create mathematical content. Some pupils just said when questioned them about it. *“Students said that “mathematics is learned by asking friends. They said that when they were absent they asked with friends and discuss with them which knowledge they missed”*.

Also, “Teacher said that mathematics is a practical subject. So, mathematics learns students by discussing with talented and excellent students”.

At the time of observation, when we entered the classroom to watch after class ended, it is found out that some of the students were discussing the math concepts they were struggling with outside of the classroom. It is also seen that some students discussed the mathematics ideas they had missed with talented children. Therefore, it is concluded that group talks are a common way for upper

secondary mathematics specialists to build their mathematical understandings. Consequently, group discussion is crucial in developing mathematical topic knowledge. It is therefore one of the best methods for learning mathematical concepts. Constructivism, as proposed by Vygotsky, holds that knowledge is socially created. He focused on working with peers, and that was the main focus of the group activity. It is seen that pupils in the classroom talked about concepts they did not fully grasp. Thus, constructivism according to Vygotsky was applied in this math lesson.

Work along with teacher

Learning math's is beneficial. As a result, students need to pay attention in class when the teacher is teaching mathematics. As the teacher solves problems in front of the class, the students must work together in the notebook. The students' next task is to finish any example problems that their teacher sets or uploads. This work broadens their capacity to reason and think. For this, they must ensure that their notes are clear and easy to read. Students are required to note everything the teacher says that aids in their understanding of the material. When asked with students about the learning and status of students majoring mathematics at higher secondary level most of the students simply responded that

Students said that "mathematics is a practical subject, so more practice is necessary for learning mathematics and actively presented in the mathematics class. Working with a teacher is also important for learning mathematics and the strategies of students majoring mathematics at higher secondary level". (Students views)

It is seen that the students were paying attention in class and actively recording mathematical problems in their notebooks while the teacher worked on the solutions. They also used this problem to perform activities in the classroom.

In summary, motivation is critical to success. The ability to be motivated is essential for progressing in life. Students learn more effectively, quickly, and intelligently when they are motivated. A motivated student has a constant desire to study. They have access to knowledge.

It is learned from the study that students were inspired to learn mathematics from a variety of sources, including their teachers, parents, friends, and personal experiences. Upon conducting interviews with them, it is discovered that motivation was a critical factor in their acquisition of mathematics education. They would not study mathematics education and would not be in this position if they were not driven by their instructor, parents, and other sources. A variety of motivating elements inspired students. For example, social, professional, and economic considerations. It is ineffective to learn without drive. Students can study more effectively if they have inspiration from their professors. Therefore, students should be motivated by their teachers. Parents should be extremely important in their children's education as well.

Conclusion.

From this study, it is found a number of motivational factors for selecting mathematics as well as different student statuses for mathematics majors in higher secondary school. There are several reasons why someone would want to major in mathematics. It is possible for math students to have a respectable career in the future. The reason for this is that math education is not highly valued by society, even if there aren't enough math students. Many people think that mathematics is a difficult subject. There is a knowledge gap that motivates students to select mathematics as their major. The number of mathematics students will rise in our society if we prioritize math students. Students will be inspired to study mathematics if we introduce the like of

thinking among people that mathematics is not a tough subject, it is an interesting one.

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