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## High School Students' Mathematics Anxiety: Discouragement, Abuse, Fear, and Dilemma Induced through Adults' Verbal Behaviour

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**Abstract.** Mathematics anxiety in students seems to be one of the most common phenomena in mathematics teaching and learning worldwide. However, mathematics anxiety induced through the verbal behaviour of other people is an understudied area in mathematics education. This paper aimed to investigate the influence of the verbal behaviour of older people on the students' interest and choice in studying mathematics. Ten grade-nine students studying in a high school in Kathmandu participated in semi-structured interviews. A descriptive qualitative research design, followed by a thematic analysis of the data through primary, secondary, and tertiary coding, identified four major themes related to the verbal behaviour of elders that induced mathematics anxiety in the students. These themes were discouragement, abuse, fear, and dilemma due to adults' verbal behaviour when choosing mathematics as an optional subject in high school. The study results have educational implications in terms of the way teachers and parents express their viewpoints and interest in mathematics and related subjects may affect students' interests and attitudes toward mathematics.

**Keywords:** Mathematics anxiety; verbal behaviour; discouragement; fear of mathematics

## 1. Introduction

Mathematical anxiety seems to be a common phenomenon in mathematics education across schools in many parts of the world. It may negatively affect students' interests, attitudes, and choices of mathematics (maths) in higher grades. Therefore, parents and teachers should understand mathematics anxiety and support students in developing study habits that can help them overcome this (Mutodi & Ngirande, 2014). Anxieties and attitudes towards mathematics are common interests among mathematics teachers, students, and researchers (Belbase, 2013; Luu-Thi et al., 2021). In this context, mathematics anxiety is considered a psychological status that manifests in students when dealing with mathematical content, whether in teaching and learning situations or in solving mathematical problems (Akbayır, 2019; Belbase, 2013). Those with a fragile self-esteem may easily become distracted from concentration which can lead to mathematics anxiety.

Other factors, such as the unavailability of a good teacher when learning mathematics at an early stage and the lack of a suitable environment in which to learn mathematics may contribute to students' mathematical anxiety (Smith, 2004). It is also a consequence of students' inability to handle frustration, school absence, poor self-concept, internalized negative parental and teacher attitudes towards mathematics, and learning through drills without fundamental understanding (Jain & Dawson, 2009). In the words of Stuart (2000), the development of mathematics anxiety often originates from a lack of confidence in situations to handle numerical information. The issue can further be linked to the lack of realistic mathematics connecting students' learning to daily life (Banes, 2005). Recent studies have associated students' mathematics anxiety with their working memory and performance in mathematics (Barroso et al., 2021; Korem et al., 2022). Such studies focused on the modelling of anxiety profiles with students' performance in mathematics to establish cause-and-effect relationships.

Mathematics anxiety, considered a fear or phobia, produces a negative response specific to learning or doing mathematical activities that may interfere with students' performance (Khan, 2019). Mathematics anxiety can affect individuals in varying ways, including a cognitive, affective, or physiological reaction, as most mathematics learners find that mathematics is complicated, abstract, and needs a great deal of rote memorization (Acharya et al., 2021). Owing to anxiety, fear, anger, feelings of loss or an emotional state when engaging in mathematical learning processes, students develop a range of subjective responses to the experience, which in turn are related to the physical and behavioural changes they may feel or experience, or express emotionally (Viver, 2021). Mathematics anxiety appears to have serious long-term consequences that negatively affect career choices, types of employment, and career development in adulthood (Caviola et al., 2019). A cognitive reaction may involve negative self-talk, blanking out, and avoidance; an affective reaction may be characterized by distrust of ability, fear of being stupid, and loss of self-esteem; and a physical reaction may be evidenced by perspiring, increased heart rate, tenseness, or nausea (Desender & Sasanguie, 2019). The emotional feeling of helplessness, loss of confidence, fear of getting things wrong, abnormal breathing, sweating, shaking, biting nails, and frustration from trying to do mathematics and not

being successful are symptoms of mathematics anxiety (Finlayson, 2014). Other symptoms can be students' feeling lost and not knowing where to start with questions or never getting the correct answer, being confused and just wanting to quit and go home, being very stressed before and during examinations, and beginning to shut down and stop listening in class (Finlayson, 2014). Mental stress and disorientation can be observed in their activities in classroom teaching, presentation, problem-solving, and in examination time (Akkuss & Hand, 2010). There can be various factors leading to mathematics anxiety, and due to loss of confidence and interest in learning, mathematics anxiety may affect student achievement with low performance and avoidance (Preis & Biggs, 2001).

Verbal behaviour was technically introduced by Skinner (1957) in the context of language and literacy. However, we have conceptualized the life stories, tales, and life experiences shared by a person with other people to influence their actions and thoughts as verbal behaviour. These behaviours may be motivating or demotivating, and encouraging or discouraging to other persons. Many students in Nepal trust their elders, teachers, and friends in terms of what to do and not to do; and what to study or not in high school or afterwards. Based on what others have said and have heard, many students believe that subjects such as mathematics and science are complex, difficult, and only the talented ones can manage them. As a result, many of them may prefer not to study those subjects, believing that these subjects are difficult to understand.

On this basis, the available scholarly works in this area have related the periphery of mathematical anxiety and its effects, anxiety levels, and causes to students' achievement. However, we have not been able to find adequate literature on mathematical anxiety arising from the verbal behaviour of adults. Therefore, this study is worthwhile. Despite some studies on students' images of mathematics (Lamichhane & Belbase, 2017), students' learning styles in mathematics (Khanal et al., 2021), and social justice issues in mathematics teaching and learning in Nepal (Panthi & Khanal et al., 2021), literature is scarce regarding how such verbal behaviours influence high school students' interest in learning mathematics. The objective of the study was to explore the influence of adults' verbal behaviours on high school students' mathematics anxiety. To achieve this objective, the research question was: How does adults' verbal behaviour influence the mathematics anxiety of high school students? This research question is essential in order to understand how high school students decide about choosing mathematics as an optional subject and how their mathematics anxieties are related to the verbal behaviours of other people, mostly adults (elder siblings, parents, teachers, and other family relatives).

## **2. Literature Review**

Several past studies have discussed students' mathematics anxieties (Estonanto & Dio, 2019; Musa & Maat, 2021; Luttenberger et al., 2018). Musa and Maat (2021) reported that mathematical anxiety impacts students' emotions, thoughts, and actions. Their study emphasized secondary level students' mathematical anxiety with reference to their cognitive, environment, and behaviour based on their learning experiences. This study, conducted among seven Malaysian students who suffered from mathematical anxiety, developed five themes

related to self-conflict, external influences, the nature of mathematical content, the importance of mathematics, and mathematics learning strategies. Further, they found that mathematics anxiety was experienced by both high and low achievers. From this study, the researchers acquired an in-depth understanding of how to diagnose and remediate students' mathematical anxiety through their perspectives based on their learning experiences.

In another study, Estonanto and Dio (2019) investigated various factors causing mathematics anxiety related to the calculus of senior high school students. The study found eight factors of mathematical anxiety, namely lack of self-confidence, interest and study habits, the role of the teacher, fear of failure, pressure from parents and peers, pressured quizzes and tests, poor skills in analysis, and the abstract nature of mathematical concepts (Estonanto & Dio, 2019). Likewise, Luttenberger et al. (2018) described the phenomenon of mathematics anxiety, including information on its prevalence, how it differs from other forms of anxiety and which variables may influence the occurrence of mathematics anxiety. Luttenberger et al. (2018) found that there was a relationship between mathematics anxiety and moderating variables such as intrinsic motivation and positive influence on performance. There were numerous possibilities to support mathematics-anxious individuals and reducing mathematics anxiety. Further, it was learned that countermeasures should ultimately be offered that were tailored specifically to each individual's personality, knowledge, and needs (Luttenberger et al., 2018).

Sometimes teachers' negative attitudes, inappropriate teaching methods, students' negative classroom experiences, parents' unrealistic expectations, and high-stake test pressure are responsible for creating mathematics anxiety in students (Mollah, 2017). Chávez et al. (2017) claimed that anxiety among high school students (both boys and girls) stems from nervousness and discomfort caused by mathematics as students face problems owing to a lack of self-confidence. Such a complicated situation does not enable students to think rationally and clearly while working on mathematics problems (Chávez et al., 2017).

The majority of people nowadays are scared of mathematics and feel powerless regarding mathematical concepts (Henderson, 1981; Kuwar, 2021). Many people's images of mathematics are perceived to be difficult, abstract, cold, and in many cultures, primarily masculine (Sam, 1999). Furthermore, Sam (1999) claimed that there are mainly three public perceptions that mathematics is a complicated subject, mathematics is only for clever ones, and mathematics is a male domain. Frank (1990) suggested 12 myths in mathematics applicable to students and pre-service teachers which resulted in mathematics anxiety and mathematics avoidance for some students and pre-service teachers. Pupils commonly have negative views of mathematics connected to bad stories, while bad experiences in learning mathematics also support mathematics anxiety in learners (Hoyle, 1982). Owing to the generally negative societal image of mathematics, young students seem to be more anxious about learning mathematics in the classroom (Sam, 1999). Some people may have had negative mathematics experiences, such as embarrassment or humiliation at failure, feeling unsupported or uncared for, being influenced by negative attitudes

toward mathematics from peers or family, and having difficulty with traditional rote learning with didactic memorization rather than understanding processes. Mathematics may trigger negative memories; therefore, many anxious mathematics students may avoid it. Poor preparation may lead to a poor performance, in turn leading to another negative mathematics experience that makes students more anxious as it reinforces their opinion that they are not good at the subject (Finlayson, 2014).

Therefore, the literature on mathematics anxiety emphasizes characteristics, consequences, and various causes or sources of such anxieties. The above brief review of literature shows that mathematics anxiety is an experiential phenomenon that affects students' cognitive, affective, and social aspects of mathematics learning. It also has a severe consequence on their choice of mathematics and mathematics-related disciplines in their future studies that are also related to careers. In addition, such long-term mathematics anxiety may spread to generations in the form of verbal behaviours that influence young students' perceptions and practices of mathematics.

### **3. Theoretical Framework**

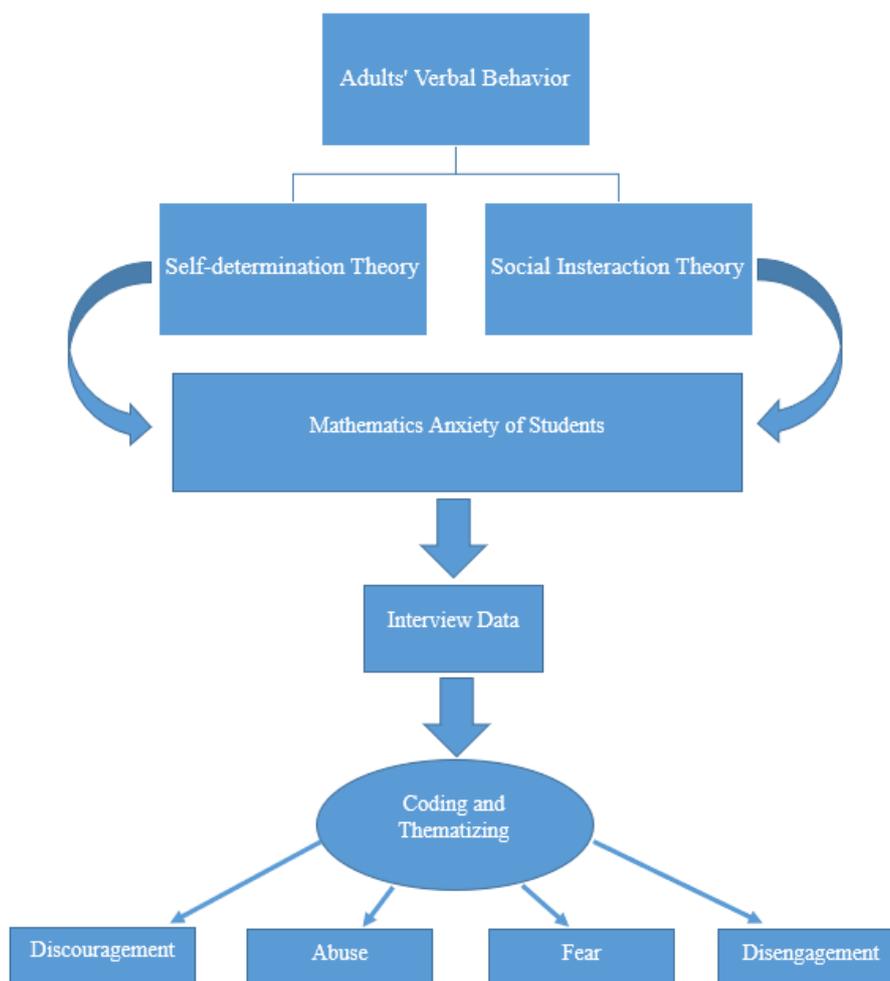
Motivation is an important concept in the learning of mathematics. Ryan and Deci's (2000) self-determination theory and Turner's (1988) interactionist theory of motivation were used in this study to guide the entire work process. These theories state that human beings naturally strive for a state of high motivation and engagement through social interaction to determine what they are going to do. There is an inherent positive human tendency to move towards growth through the paths that connect them with each other that may help in their self-determination of what to study and how to go about it (Vansteenkiste et al., 2009). The self-determination theory of growth is associated with autonomy, competence, and relatedness (Ryan & Deci, 2000). Self-determination has been defined as a combination of an individual's attitudes and abilities that lead them to set goals and to take the initiative to reach them (Ryan & Deci, 2000). If a person is motivated enough to pay attention, motivation can reduce their anxiety about mathematics learning. Students are more motivated to persevere, produce a high-quality effort, learn in-depth, and perform well in the classroom and on standardized tests (Ng et al., 2016). On the other hand, individuals' actions and their choices of such actions may be influenced by others in a social context. According to Turner (1988), social interaction influences and reorganizes the behaviour of another person. In this sense, students' mathematics learning behaviour may be influenced by their peers, parents, and teachers. Therefore, students' mathematics anxieties as triggered by adults' verbal behaviour can be discussed according to the self-determination theory and social interaction theory. These theoretical concepts may provide teachers and educators with a view of mathematics anxiety induced as a result of adult verbal behaviour through a relational lens, not as an absolute individual trait.

### **4. Methodology**

An interpretive constructivist research (Schwandt, 1998) was conducted from the viewpoint of nominalist ontology (Bryman, 2012), and subjectivist and relativist epistemology with research as a means to explore contextual reality based on

individual experiences of the anxiety-related phenomena (Cohen et al., 2011; Denzin & Lincoln, 2018). These assumptions in this study consider human knowledge as a subjective construction of meaning by the researchers through the interpretation of participants' experiences of mathematics anxiety induced through adults' verbal behaviour.

This study applied descriptive qualitative research designs with structures, processes, and strategies aimed at obtaining answers to research questions (Creswell, 2009). This involved the process of collecting and analyzing data, clarifying the premises and results, and linking their potential meanings with the existing data (Bryman, 2008) in order to achieve greater accuracy in understanding the influence of verbal behaviour on students' mathematics anxiety (Brewer, 2005). A conceptual framework has been generated by connecting the verbal behaviour of adults to their perceptions and experiences of mathematics as a whole, and its impacts on learners (Figure 1). Figure 1 shows how a student's self-determination and social interaction with adults may influence their beliefs and attitudes toward mathematics, leading to differential mathematics anxiety. The conceptual framework also shows the connection of data collection, analysis, and interpretations leading to the conclusion.



**Figure 1: Conceptual framework for studying students' mathematics anxiety induced by adult's verbal behaviour**

**4.1 Research Participants**

Ten students out of 50 from the same grade nine class of a community school in Kathmandu participated in the study. Only ten students were selected purposefully because the verbal behaviours of their elders had a remarkable effect on their mathematical studies, of which the teachers had become aware. The inclusion criteria were that the students should have demonstrated mathematics anxiety, and that they had reported (to the mathematics teacher) that their elders talked about mathematics. They were selected for the study as research participants on the recommendation of their class teachers based on the inclusion criteria. For a qualitative study, a sample of ten is considered enough. So far, there was enough qualitative data to the level of saturation while generating themes (Cohen et al., 2011, Creswell, 2009). Among the ten participants, six were boys and four were girls. Male participants were given pseudonyms such as Suresh, Bishal, Anuj, Dinesh, Umesh, and Mukesh, while female participants were named Geeta, Bindu, Mona, and Ramita. Their real names, schools, and photographs were not disclosed to protect their identity owing to ethical concerns.

**4.2 Data Collection Tool and Procedure**

A semi-structured interview was considered appropriate because of its flexibility and opportunity to ask questions based on participants' responses. It was conducted with each research participant to understand the feelings, experiences, and their impacts on the participants' mathematics anxiety and interest in studying mathematics (Husban, 2020). An interview guideline was prepared to guide the interview process. The research tool was designed with a few structured leading questions to be asked to all the participants. Additional prompts were used based on the participants' views and considering their current experiences in mathematics learning (Flick, 2015). This allowed for less structured interview questions with more open and word-based ones (Cohen et al., 2011). However, care was taken not to mislead the interviews owing to the addition of open, unstructured interview questions so that most of the required information could be collected from the participants.

The semi-structured interviews included participants' thoughts, feelings, beliefs about mathematics, verbal behaviours, and their interests in studying mathematics (Galletta, 2013). The head teacher was informed about the study beforehand. The researcher (the first author) asked the school principal's permission to conduct the study with the students. The head teacher helped in the recruitment of ten students (six boys and four girls) from grade nine as research participants based on the referrals of class teachers and mathematics teachers to get students having mathematics anxiety and who have shared their adults' verbal behaviour about mathematics learning. The students were given a voluntary choice to participate in the study or not. They were informed about the study, its purpose, and the time required for the interviews. Several students voluntarily wished to participate in the study. However, the head teacher helped in a purposive selection of ten students for the study from a grade-nine class with the help of inclusion criteria set by the researcher. Each student was

interviewed for about 10-15 minutes. The interviews were audio-recorded, transcribed, and translated from Nepali into English for further analysis and interpretation.

#### **4.3 Data Analysis and Interpretation**

Qualitative interview data was analyzed by classifying and interpreting concepts about implicit and explicit meanings within thematic structures (Anderson, 2006; Flick, 2015). The data analysis was applied to determine conceptual issues in the participants' experiences (Best & Kahan, 1999). In this research, the thematic data analysis process was applied to extract the essence of the experiences of the research participants by identifying patterns or themes within qualitative interview data (Braun & Clarke, 2006; Clarke & Braun, 2013). The first author coded the transcribed interview data into meaningful units based on the concepts they represented. Then, the codes were grouped into meaningful categories by relating them together based on their meanings or concepts. He then shared the codes and categories with the second and third authors to discuss the themes. The researchers agreed upon the codes and categories to align with four broad themes. Overall, the thematic analysis was consistent with the qualitative research (Denzin & Lincoln, 2018) regarding the conceptualization of meanings from the participants' voices and interpreting them in terms of the meanings they bring to them (Lochmiller, 2021). Therefore, the thematic analysis was carried out by clarifying the main concepts as codes and categories to recognize their utility, versatility, and ability to describe and inscribe the major themes (Braun et al., 2016) with repetitive patterns (Braun & Clarke, 2006) applying a range of theoretical and epistemological frameworks.

#### **4.4 Maintaining Quality Standard**

The quality criteria of the study were maintained with credibility, transferability, dependability, authenticity, and conformability (Korstjens & Moser, 2017). The credibility of this study was maintained by creating an environment of trust between the research participants and the researcher (interviewer) to obtain authentic data. The researcher visited the schools and the participants multiple times to establish a comfortable environment for the participants to take part in the interviews. Participants were initially informed of the aim of the study, and the fact that their participation was voluntary. The ethical aspects of the study approach were guided by informed consent, privacy, and data protection (Jameel & Majid, 2018). Therefore, the participants were also informed that their identity would be protected by changing their names and not revealing their pictures in the study reports. There was no impact of the power relation between the interviewer and the research participants. The participants were assured that they could leave the study any time they wished to without any penalty or consequence.

The credibility of the data was maintained by focusing the interview questions on participants' experiences of adults' verbal behaviour and their impacts on mathematics learning and mathematics anxiety. The transferability criteria were applied to generate the themes that could possibly explain similar experiences of other students who were not the participants in the study. The dependability criteria were assumed with full responsibility to represent the participants'

voices true to their words so that the themes fully depended on what participants said during the interviews. In this way, the criteria of authenticity were also maintained by listening to the audio interviews by the third researcher and looking at the interview transcripts and the thematic excerpts to present the data in the study, thus confirming the participants' voices in the interpretations (Denzin & Lincoln, 2018; Thorne, 2022).

## 5. Results and Discussion

The analysis of interview data from ten participants yielded four major themes associated with discouragement, abuse, fear, and dilemma through the verbal behaviours of adults, parents, and teachers in relation to mathematics anxiety. Each of these themes has been discussed by presenting participants' narratives, extracting major concepts from the narratives, and relating them to the relevant literature. While relating the themes to the relevant literature, social, intellectual, and psychological aspects have been considered in relation to adults' verbal behaviours and their impact on students' mathematics anxiety. In particular, the verbal behaviour of adults produced negative effects on the learners' choice of mathematics as an optional subject in higher-level studies. The thematic analysis of interview data extracted the four major themes. These themes have been discussed by connecting them with relevant theory and literature as follows.

### 5.1 Discouragement through Verbal Behaviour

Why do some students not have much interest in subjects such as mathematics? Why are other students interested in choosing this subject? Almost everyone advises that if someone really wants to study it, they choose the subject, otherwise not. The motivating and demotivating factors are highly rooted in every student's choosing or not choosing a particular subject at the school level. Mathematics is widely known as a subject that many students hate (Swan, 2004). We often hear students say, "I hate maths class" or "Maths is too difficult". Some students do not like mathematics because they think it is boring. They may view mathematics as an incomprehensible, abstract, and irrelevant subject relating to symbols and numbers. Those are the personal feelings of students about mathematics. Nevertheless, demotivating factors in Nepalese society expressed through verbal behaviour are remarkably significant. A student, Bishal, expressed his views about mathematics and how verbal behaviour negatively influenced his interest in studying mathematics as follows:

*We also discuss math in class and solve problems. That is right. All my friends have realized that mathematics is a complex subject, and everybody suggests not to study mathematics furthermore. I find math difficult. I don't understand why and when somebody understands it. I also have to understand, but it seems difficult for me. Mathematical formulas are harder to remember. My father always says, "If you feel mathematics is difficult, no need to study it. Only the study of mathematics does nothing, it is just a burden to you. Mathematics is a subject made only for creative students and you are not among them. You need to study only the easy subjects."*

Bishal's narrative excerpt includes some key concepts related to demotivating factors for mathematics. For example, students realize that mathematics is difficult; they are not interested in continuing their study of mathematics; it is

difficult to remember mathematics formulas; their fathers advise them not to study mathematics; mathematics is difficult; and mathematics is only for creative students. These views indicate that many of the students in the classroom talk about mathematics, and about solving mathematical problems, although they feel 'mathematics is a difficult subject.' Many students listen to their elders, namely parents and teachers, and if they are motivated or forced to take any subject, then they go for it. Otherwise, they do not. Some parents actively dissuade their children from studying a problematic subject as their optional subject. Other parents say that mathematics is tough and their children do not have the ability for it. Therefore, the children are afraid of selecting mathematics as a subject at the school level. When they progress to higher education, their image of mathematics is that of a difficult subject, and they do not study it at the college level either (Lamichhane & Belbase, 2017). According to Oxford Learning (2019), some students do not like mathematics because they think it is boring. Numbers and formulas are not so interesting to them; instead, they select history, science, languages, or other subjects that are easier for them to understand. They think that mathematics is abstract and irrelevant. Many students struggle with mathematics and find it difficult to remember all the rules and equations (Lamichhane & Belbase, 2017). It is hard to memorize everything in mathematics, and students have to repeat the same exercises until they find the correct answer, which can be frustrating (Sullivan et al., 2014). Frequently, wrong answers can damage their self-confidence and lead them to drop out of the subject.

There are several reasons why children find certain subjects difficult, for example mathematics, because they are inherently weak in a particular field, have knowledge gaps, or may need more time or practice to complete specific tasks. The verbal behaviour of adults is also one of the demotivating factors (Sullivan et al., 2014). Repeated failure in a particular subject will eventually cause negative associations with the subject that may lead to a lack of motivation to learn (Wong, 2021). To find the best possible solution, it is essential for adults to talk to the child and help them determine the reason for their difficulty in learning the subject. If children find the topic meaningless or useless, they may encounter learning difficulties. To motivate children to study, parents usually look for a simple explanation. Learning will bring good grades, and good grades are necessary for success in life (University of Tübingen, 2017). This is meaningful for parents because children do not have the same life experience and do not necessarily understand why success is so important.

## **5.2 Abuse of Verbal Behaviour**

Nepal is the first country to criminalize the corporal punishment of students in schools in South Asia, and it was reported to be the 54<sup>th</sup> country globally to do so (Kamat, 2018). In 2006, the Supreme Court of Nepal issued a judgment calling the government to take reasonable and practical measures to prevent corporal punishment and cruel, inhuman, or degrading treatment of children. Despite the legal framework, teachers across the country continue to beat students with fists, feet, sticks, and even terrible *shisnu* (stinging nettles), exerting inhumane pressure on them (Ghimire, 2019). Article 39 of the new Constitution of Nepal adopted in 2015 prohibits any form of abuse and violence against children in the home, school, or community. Finally, the new Children's Law was passed in

September 2018, which guarantees all children the right to be free from all forms of violence, and physical or mental punishment. Moreover, it imposes a fine of up to 50,000 rupees and one year's imprisonment for those who carry out physical or psychological punishment or conduct disrespectful behaviour at home, school, or elsewhere (Nepal Law Commission, 2018).

Maintaining a positive and educational classroom environment is challenging, especially in classrooms that require frequent intervention due to disruptive student behaviour (Panthi & Acharya et al., 2021). Punitive disciplinary measures are usually ineffective when responding to a student's disruptive behaviour (Dhaem, 2012). Although the punishment neither improves students' study habits nor improves the classroom environment, teachers frequently punish students or use verbal abuse. Our participant, Bindu, expressed her experience of being punished, which affected his learning of mathematics.

*One day, there was a class test when I was in grade 5 at a private school. I got 16 marks out of 20. The math teacher beat me very bitterly for not getting full marks. I could not sleep for the whole night remembering this incident. Since then, I had promised myself I would never go to school to study. But a few days later, I felt easy and continued my study. But one of my classmates dropped out of school. He stayed at home for a whole year and was admitted to another school the following year. His parents were also illiterate and did not pay much attention to his study. Time and again, they would say, "You will feed yourself by carrying a heavy load (as a porter) like us, why don't you study it now?" Now, I am pretty good at mathematics. This is due to the fear of mathematics teachers. The teacher misbehaves when I make any mistakes in math. However, sometimes he supported me in mathematics learning.*

The narrative excerpt by Bindu included some important concepts, for example, performance in mathematics, punishment by the mathematics teacher, worry about mathematics, improvement in mathematics, student dropout, parental role, negative reinforcement, and positive outcome of negative verbal behaviour. The teacher had beaten (physically punished) a student because she could not achieve full marks in a class test of mathematics. Teachers' negative actions in the classroom can adversely affect the students' psychology and thinking or images towards teachers or the subject taught in the classroom. For some students, the negative behaviour of the teacher may lead to a change in their learning when they improve and study hard to achieve better results to avoid such punishment. However, it is not a common practice. She thought that she would never go to school again. Nevertheless, she did not quit school; instead, she studied hard to achieve better scores in mathematics tests.

In many cases, owing to the inappropriate behaviour or violence of teachers, students abandon their mathematical studies forever (Wagley, 2012). Teacher stress leading to inappropriate behaviour is a concern in the educational community. It has many negative short- and long-term consequences for students, such as depression as well as psychological and social problems (Lewis & Riley, 2009). Students who lack proper guidance and motivation are likely to fail their examinations owing to various reasons, the most prominent of which is teacher behaviour and the school environment (Wagley, 2012). Failure in school can have severe consequences if left untreated. Students who fail in mathematics

may lose confidence, become depressed, lose motivation, and are more likely to fail again (Kamal & Bener, 2009; De-Juanas et al., 2020).

One of the research participants, Anuj, shared his experience during the interviews:

*I find mathematics a challenging subject. I don't remember a single moment when someone praised my work in mathematics. My father is a bus-driver. He talks more about his job than my studies. My parents cannot support me in mathematics assignments and other activities. Ever since I started going to school, neither my parents nor teachers have talked to others about my positive attitude. When someone comes into our room and talks about the children's studies, I often hear my mother saying, "My son is an idiot and never performs well in his studies", or my father saying to others, "My son is khatam (bad) and his study is jhan khatam (worse)." My parents mistreat me for the same reasons. When my parents meet with teachers in my school to talk about my study, the teacher always tells my parents that I cannot study well and I will never pass the grade. On the same issue, my parents scold me very bitterly. When the math exam reports are out, whatever the outcome may be, my parents and teachers start abusing me for getting a bad result with a low grade. Now, I know that no one talks well (positively) about my studies. When I get a low score on math test, my father always scolds (verbally abuses) me and tells me not to go to school and not to waste his money in vain. I always worry about getting low score on a math test and being scolded after each test.*

Some key concepts from Anuj's narrative are: no appreciation of mathematics learning, no support from parents, verbal abuse at home, discouraging comments from the teacher, low performance in mathematics, and belief that mathematics is difficult. Research studies have reported parents' neglect and psychological abuse of their children in Nepal (Neupane et al., 2017). In a developing country such as Nepal, most uneducated parents think that their child's test scores are everything for assessing student performance and are used to measure student progress as a whole. Society believes that low academic performance is an indicator of the negligence of students; this then can be a trait of children based on their performance. Achieving high scores on the standard test is seen, by most parents, as a way to achieve professional and academic success. If their children get poor grades, parents worry about their academic and career success. After seeing the poor mathematics performance of their children, parents often blame them (children) for the root causes of improper homework assignments, lack of diligence, or poor preparation. In Nepali society, many parents still seem to think that if their children read books for a long time, they are doing well.

Misbehaviour, whether verbal abuse or physical maltreatment from parents and teachers, cannot improve the study of students; however, such behaviour can dampen students' interest in the subject, and they may likely become further disappointed, fearful, and uncooperative. Most parents punish their children physically or mentally, or both (Kandel et al., 2017) by simply viewing their test results in a negative way or making negative comments without examining the root cause of their failure. Sometimes, to avoid punishment from their parents

while performing low in math, children try to hide their poor test results, as they may feel guilty and fearful of showing the results to their parents. Just because a child did not study well or performed poorly in a test, disciplinary action can have the opposite effect. Moreover, poor instruction cannot improve ratings but can only worsen the situation. In this regard, Edelman (2018) suggested that students learn better when they are not afraid to take risks and make mistakes. Fear can be disastrous to teaching and learning mathematics (and other subjects).

Teachers can motivate students by praising their efforts, relating their experiences to daily life, and telling stories about successful personalities in mathematics and related subjects. Students would subsequently be motivated to work hard for the teacher. They may feel that the teacher is doing [the best] for me and I should do [the same] at any cost (Hewson, 2018). An experienced and motivated teacher transforms their students' attitudes from "I can't do it" to "I can do it." Children develop attitudes towards learning during these early years that subsequently affect their school and future life. When teachers and parents provide the proper support, an open, adventurous learning environment, and encouragement throughout these years, students will be more creative and adventurous learners throughout their lives than children who do not receive this support (Nesbit et al., 2021).

### 5.3 Fear of Verbal Behaviour

Mathematics is a necessary subject for all people throughout their entire lives, from solving daily life issues to more complex problems in science, technology, engineering, economics, accounting, and the like. Unfortunately, many students experience stress and anxiety when faced with this subject. The difficulty with mathematics can affect a student's ability to interpret and apply knowledge, and it can subsequently affect their adult life. Criticism and punishment by teachers may negatively affect children's interest in learning mathematics and cope with the difficulty in mathematics problem-solving, leading to giving up and quitting the class (Lewis & Riley, 2009; Acharya et al., 2021). The negative verbal criticism that can be used to threaten or mentally torture children can be termed verbal abuse. Emotional and verbal abuse can have severe negative consequences, just as serious as those of physical abuse. One of the female participants, Mona, said that she did not study the extra mathematics owing to fear of verbal abuse from others.

*My upper-class friends (seniors) used to tell me that extra math is very difficult and that there are many formulas to memorize. Even if someone asked the teacher about something in the math problem, the teacher would scold, saying, "If you are not capable of studying additional mathematics, why did you choose it?" When I went to attend an extra math class, the teacher said that 'If math is difficult for you, choose another subject', but in the middle of the session, I could not hear that extra math is difficult. Listening to everyone, I didn't think I could continue studying the extra math. Then I gave up the idea of studying extra mathematics and studied another subject.*

The narrative by Mona includes some key concepts, namely extra mathematics is difficult, too many formulas, discouragement from the teacher, and giving up and taking another subject. Upper-class students (seniors) usually talk about their experiences in different subjects to the students in the lower grades (juniors). When students reach the upper grades, at a time, their subject choice is influenced by teachers, the hearsay of other students in that class, the syllabus, and former students who share negative experiences of mathematics.

Mathematics serves as a gatekeeper for many students to allow them access to or prevent them from taking further mathematics and related subjects at a higher level (Martin et al., 2010). Here, the upper-class students (seniors) tell the lower-class students (juniors) that the extra math is too complicated, the formulas are too difficult to memorize, and the teacher scolds (verbally abuses) those who choose extra mathematics, although they are weak in mathematics. This seems to have created fear in the lower-class students (juniors) towards extra mathematics, thereby creating a barrier. When one of the students went to the extra mathematics class, she found the subject teacher's behaviour unhelpful, as the previous class students had warned. She decided not to study extra mathematics and chose another subject. She would thus lose the opportunity and benefits of learning mathematics and related subjects in her future studies and career. In such a way, the verbal behaviour of upper-class students and teachers is sufficient for a student to abandon a particular subject, such as extra mathematics.

The next participant's (Ramita's) experience is also a fearful one:

*As soon as I reached home from the examination hall, my big brother saw the mathematics question paper and asked me about my exam. I said that I could not do well. My brother scolded me in front of my parents that the mathematics paper was elementary, and I spoilt the exam due to carelessness in the study. Since then, I have always been afraid of getting scolded by my brother and parents, so I quickly tear off the mathematics test paper as soon as the exam is over.*

Many students are afraid of their family members, such as older brothers and sisters, parents, and grandparents, because they ask the students about preparing lessons, home assignments, and examinations. It would be better if the family members could help the students. Nevertheless, if the family members criticise the students instead of helping and encouraging them, the students are afraid of their family members making negative comments about them leading to adverse consequences in their mathematics learning. Instead, family members, including parents, can engage students in many mathematics-related activities at home to support them in learning and development in mathematics (Jay et al., 2018).

However, when a family member (especially an adult) shows a negative attitude toward students' efforts and gives a negative reinforcement in the form of criticism, the student may hide the facts about his or her studies, and the situation may worsen. One of the participants expressed that she tears up every mathematics test paper as soon as the examination is over owing to the fear of being scolded (verbally abused) by her family members. The lack of family members' understanding of the problem or support of the student, as well as

their negative comments may likely force the student to hide her problems with mathematics learning. Family members sometimes may not know how to support the student, and they also may not know enough about school mathematics to be able to help their children at home. Therefore, they become frustrated (Jay et al., 2018). Students who are good enough in mathematics may also become nervous during an examination and be fearful of its result. Therefore, mathematics teachers should promote a positive learning environment to help students develop positive self-esteem toward mathematics that may reduce their anxiety toward mathematics (Koca, 2018). They may create such a conducive environment for mathematics learning through group work and other creative activities (Koçak et al., 2009).

#### 5.4 Dilemma through Verbal Behaviour

Most people communicate with others about their interests, emotions, and experiences by means of verbal behaviour and try to motivate others regarding the matters of their interest (Durksen et al., 2017). Thus, people's verbal expressions may convey important information about another person's intentions, and this information may possibly modify or influence the behaviour or decisions of other people. The interpretation of a verbal communication affects the social perception and behaviour of others (Stouten, 2009). The verbal behaviour of adults in Nepalese society is taken as the key factor in students' decisions in subject choice (Yadav, 2012). Some suggestions may likely turn into a pathfinder for the young students so that they can make the right decision for their future study and career. These suggestions most likely help in either solving their social dilemmas or else they make their choices even more difficult.

In this context, Anderson (2006) suggests various reasons for encouraging students to choose mathematics. These reasons should be smarter, economically prosperous, have access to higher education in the STEM field, live in the global world, cope with changes, and be creative. However, many students may not realise these and other potential values of learning mathematics in their lives. They are, unfortunately, influenced by the negative verbal comments of others about terrible mathematics experiences and subsequently find themselves in a dilemma. In our research process, some of the participants said that they were fraught with indecision after the verbal comments of the adults in their family. One of the informants, Dinesh, had a different experience:

*My grandfather did not get any opportunity to study in schools and colleges. He says, "Education at present is useless. This education spoilt everyone. After having some education, people started leaving their village and moving toward the city. The village is going to be an empty place. The farms are turning to barren lands. The educated daughters-in-law have no respect for elderly people and other in-laws in the family. If you become a foreigner to your place after being educated and become a stranger in your hometown, how is that education anymore better? We did everything in your job without a formal education. In our time, the fields (farm lands) were fully cultivated with crops and vegetables. We had several cattle in our farms. We were perfect in maintaining farms and raising cattle. What do today's educated people do? They only misuse the fertile agriculture land in the name of roads and other constructions. Besides, when I was uneducated, I used to sell the crops,*

*ghee, goats and chicken. Whereas, your father is somewhat educated. Now, he buys everything to survive. How can I say that his education did anything better? If a person becomes dependent on education without work or practical skills, he does not become self-reliant and independent. Such education is useless." Listening to my grandfather's words, I sometimes feel that I should leave school. I should go to the village to cultivate and raise cattle. Again, my father says that people at the present time are useless without education. Therefore, you should study well.*

The above narrative of a participant Dinesh has some vital elements such as the generation gap, the transition from rural to urban life, the neglect of the villages, the neglect of the traditional occupations, the negative attitude toward education, the mismatch between modern education and the expectations of elderly family members, and the motivation to continue education. One of the participant's grandfather was completely illiterate, and he was not concerned about being illiterate because he had no problem with his hand-to-mouth existence in the village. Although illiterate, he seems to have earned enough with a high income from the farming and raising livestock. He seemed unhappy with those who went to the cities after being educated and did not return home, and left their village lands uncultivated. He is disappointed that educated people seem to have forgotten their culture more than illiterate people have. He is worried about buying the foodstuffs he used to sell at his age. Therefore, he tells his grandson that it is better not to have an education and that it is not good to struggle with difficult mathematics. On the other hand, Dinesh's father and teachers motivated him to study mathematics.

The participant, Dinesh, was faced with the dilemma of being motivated to study mathematics on the one hand and being discouraged from doing so on the other. This points to a clear generational difference in attitude towards education. Along these lines, Bishara (2018) claims that social and ethical dilemmas are practical. Faced with social and ethical dilemmas, one has to decide how best to deal with them among the options available to them that are mutually exclusive. For example, a dilemma may be related to values, beliefs, ethics, and behaviour such as generosity, decency, honesty, respect for life, or obeying the law. Social and ethical values may affect the resolution of such dilemmas, and there may not be a single clear approach. Even though people have lived uneducated lives in the past, formal education is important in today's scientific age. In today's world, the adults in society and the teachers in the schools can create a positive environment for the children to learn (Vibulphol, 2016). Young children learn from everything they do and experience owing to their natural curiosity, exploring and discovering things in their environment (Piaget, 1990). During these early years, children develop attitudes towards learning mathematics or other disciplines that may likely affect their later school life and career.

Therefore, educators, parents, and teachers should emphasize the importance of learning mathematics with greater intrinsic motivation in children's early years. The generational gap in a family should create new opportunities for young students with diverse ideas and knowledge rather than regarding these as a

barrier to modern education. Education should transform lives and quality of life in terms of a better and healthier environment, food, and lifestyle. Family education can be an option for avoiding such dilemmas regarding different voices related to education due to a generational gap that might have created differences in work ethics and respect for each other (Adcox, 2021), besides issues of education in general and mathematics in particular.

## **6. Implication and Conclusion**

This study explored the connection between students' preference for mathematics, mathematical anxiety, and the verbal behaviour of adults in Nepalese society. The study's findings showed how verbal behaviour could discourage, abuse, cause fear, and lead to a dilemma among students regarding mathematics learning and their interest in continuing mathematics in higher levels or grades. These findings further showed that adults' expressions of like or dislike toward mathematics in front of their children or students could affect students' interest in and choice of mathematics as a subject. Dislike of mathematics may result in having negative perceptions of the subject, and even eventually giving it up. Therefore, meaningful and effective teaching practices are called upon for improving the image of mathematics among the young adolescent students (Ukobizaba et al., 2021). The images, perceptions, and experiences of the mathematics teaching and learning shared by the adults may either motivate or demotivate the young adolescent students when learning mathematics and developing their perceptions towards selecting mathematics as their major in high school. Therefore, the study's findings have pedagogical implications because of the way teachers and parents express their views of and interest in mathematics and related subjects. Students may consider their verbal behaviour as a reference in forming their opinion and developing their attitude toward mathematics accordingly. Parents and teachers should not express their negative anxieties, frustrations, and lack of ability to deal with mathematics or mathematics-related issues in front of their children and students. Instead, they should help in generating curiosity, wonder, and excitement in learning mathematics (Knuth, 2002). A positive discourse in the mathematics classroom may also help reduce students' mathematics anxiety (Suh et al., 2008).

In Nepalese society, the adults in the family and society are considered to have more knowledge and experience in a specific field. They can guide and provide suggestions to young adolescent students. The same is expected in education, especially regarding the choice of subjects at the school level. Before selecting the subject of their choice, students listen to the adults in the family, society, teachers, and other senior students from the upper grades. People's verbal behaviour may be either motivating or demotivating to the children when selecting particular school subjects, including mathematics. Inspiring stories and the experiences of adults can incentivise young adolescent students to choose mathematics as their major at the upper level of high school. It may provide students with self-belief, self-esteem, and willpower in deciding mathematics as their major without any anxiety or fear. However, conflicting and negative stories and experiences can demotivate, intimidate, and create dilemmas for the students regarding decisions to take mathematics as a major. It is concluded that teaching activities with carefully planned strategies can play a vital role in mitigating students' mathematical anxiety (Mollah, 2017). Understanding the

causes and consequences of mathematics anxiety is vital for improving the teaching and learning of the subject (Metje et al., 2007).

This study has limited generalizability due to the small sample of participants in one school. Therefore, further research in the field of verbal behaviour of adults relating to young adolescent students in choosing subjects at the high school level is necessary. The findings of such studies will help determine the possible impacts on the students' cognitive, affective, and social aspects of learning mathematics. Future studies can focus on the following research questions: What kind of verbal behaviours of adults regarding young adolescent and teenage students can trigger positive motivation in mathematics learning? How can adults help reduce young adolescent students' mathematics anxiety through verbal behaviour? What are the social, cultural, and historical factors of adults' verbal behaviour that influence students' anxieties, attitudes, and beliefs about mathematics?

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The authors declare no conflict of interest in publishing this manuscript.

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