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Interest in Mathematics in the Ethnic Group of Nepal

Madhav Prasad Poudel
School of Engineering, Pokhara University, Kaski, Nepal
Corresponding address: pdmadav@gmail.com

Abstract

Mathematics is the base for modern civilization. Today it is impossible to advance in the branch of science or some areas of economics and social sciences without the application of mathematics. The interest in learning mathematics has been declining these days. The study conducted through survey on the interest in mathematics in ethnic group of Nepal showed severe results. The number of sample taken was 365. The mathematics interest survey was filled by the students above grade twelve. There were various factors influencing the interest in mathematics which include lack of fundamentals, parental attention and guidance, distraction, financial constraint and mathematical learning disability. The most dominating factors for losing interest in mathematics were lack of fundamental knowledge on mathematics and parental attention and guidance. Furthermore, it was found that only 0.8 % ethnic group students were interested in studying mathematics. In fact, students in Nepal generally have lower interest in learning mathematics. Thus, how to enhance students' mathematics interest is major problem, especially for those ethnic group students. Therefore, the teacher should change the way of teaching for gaining interest in mathematics for all the students in Nepalese schools and colleges.

Keywords

Interest, mathematics, ethnic group, MLD, parental guidance, financial constraints

1. Introduction

Mathematics occupies an important place in the curriculum. Keeping in view its importance, the Nepal government recommended it as a compulsory subject for students at school level. The latest scientific and technological developments are based on mathematics and have proved mathematics as a powerful tool for any scientific achievements. Indeed there is something for everybody to gain from the universal language of mathematics. Today it is impossible to advance in the branch of science or some areas of economics and social sciences without the application of mathematics. The history of teaching mathematics is as old as human civilization. Nowadays, mathematics is a powerful tool for any sciences. The aim of mathematics education differs according to the country's socio-economic condition, the innovation of science and technology in the society and the existing educational status of a country. Also the history of mathematics reflects the noblest thoughts of countless generations. Nepalese mathematical system is also highly influenced by the world's mathematical system [1]. Numerous explanations have been given for the lack of interest in any subject among the students in the world. Most of these explanations focus on physical, psychological and mental capacities rather than the education programs provided by educational institutes in the country. Many factors may be responsible for the poor performance of students in Mathematical ability. There are not much written documents on the history of mathematics in Nepal. Therefore, this study attempts to find out about the interest in mathematics throughout the different groups of Nepal. In Nepal's context, there has not been any study done to find out the interest in mathematics in any class, gender, or ethnicity group. It is reported that in ethnic groups the number of ethnic population studying mathematics intentionally in higher levels (Above 12 grade) is only one percent of the whole student population [2]. Various studies have focused on factors contributing to the success in mathematical courses. These factors are spatial ability, anxiety, gender, learning styles, social factors, age, under-preparedness, attitude, language ability, mathematical ability, tertiary environment and students' academic background [3-6].

Heinze et. al [7] described that the interest in mathematics can be regarded as a predictor for mathematics achievement. In addition, the interest in any subject is based on parental attention and guidance, distractions, financial constraints and fundamentals in the subject [8]. Besides, the students find mathematics interesting if they have ability to solve the problems and are not

interested in the subject if they have mathematical learning disabilities (MLD)[9-10]. Furthermore, the mathematically talented students show some anxiety in learning mathematics which shows that they have interest in the subject. Reyhner [11] identified seven areas of needed change to create interest; large impersonal schools, uncaring and untrained teachers, passive teaching methods, inappropriate curriculum, inappropriate testing and student retention, tracked classes, and lack of parental involvement. Luitel [12] portrayed multifaceted and emergent inquiry into the protracted problem of culturally decontextualised mathematics education faced by students of Nepal, a culturally diverse country of south Asia with more than 90 language groups.

Another study conducted by Ginsburg et al. [13] suggest that one of the causes for lacking interest in mathematics is due to the teachers who are not trained in teaching mathematics but still teach the subject. Also the study [14] added that some mathematics teacher preparation is not sufficient to motivate the students in the subject. Nasrin, and Nasreen [15] mentioned that mathematics classes are challenging and boring for many ethnic students. The low expectations are based on racist ideologies that create a climate ripe for educational failure. Bill and Jafeth [16] Illustrated that American Indian dropout due to the fact that some students give up an education that they do not find relevant to their lives. An issue of teaching mathematics to Indian based ethnic students is based on the student's language processing and cultural orientation. The influence of language and culture on a bilingual students learning of mathematics has been investigated by a number of researchers. Leap et al. [17] observed that Indian student's errors in mathematical problem solving were due to the use of Indian language mathematics-based problem solving strategies rather than inaccurate mastery of Western mathematics skills. The capacity of students to learn mathematics is also influenced by language, culture, and learning style. However, the learners of mathematics do not consider these factors. For example, textbooks are written in such a way that they present mathematics as information to be memorized. To learn mathematics successfully, many students need a multi sensory approach to mathematics than is usually encountered in schools.

Davison and Schindler [18] identified three areas in which the students have difficulty in learning mathematics which includes language, culture, and learning modality and were too simplistic to attribute minority students' difficulties in learning mathematics to any one factor

alone. Maier [19] pointed out that many people, in the Indian cultures, find mathematics devoid of meaning—nothing more than jargon and symbol manipulation.

An ethnic group is a group of people whose members identify with each other, through a common heritage that is real or assumed. This shared heritage may be based upon putative common ancestry, history, kinship, religion, language, shared territory, nationality or physical appearance [20]. In Nepali context ethnic group are 'Indo-Aryan‘ or Khasa and 'Tibeto-Burman’ or Mongols [21-23]. So this attempt will be the first of kind in Nepal to explore the interest in mathematics in the basis of racial/ethnicity. The main objectives of this research study are as follows:

a) To find out the interest among the students of ethnic group of Nepal in Mathematics

b) To explore how the parental attention and guidance, social economic status, distraction, fundamental knowledge on mathematics and learning disabilities of the students affect interest in the subject

2. Materials and Methods

This is a quantitative research conducted using survey method. A structured questionnaire was given to all the students. The questionnaire of this study deals with determining the effects of significant factors for interest in mathematics. In describing the data, descriptive measures was used such as percentages and bar diagrams to determine the significant relationships between factors and interest in mathematics among ethnic group. Student attitudes and interests in mathematics was assessed using a combination of statements from questionnaires developed and were validated by a panel of experts in mathematics education. The mathematics interest survey included twenty two statements. There were three measuring subscales which were as follows: (1) Family encouragement, (2) Peer attitudes toward mathematics, (3) Teacher Influence. Each subscale consisted of four-statements and was measured using a 5-point likert scale (1-strongly disagree to 5-strongly agree). The mathematics interest survey and subscale statements are included in the annex. Participants were also asked to describe their current interest in mathematics by circling one of five statements that best described their current feeling from “dislike it” to “very interested.” In order to establish construct validity of the questions, a panel of field experts was sent the questions to get their opinions. Based on their feedback, questions were finalized.

Figure 1 shows the flowchart for the methodology for the study.

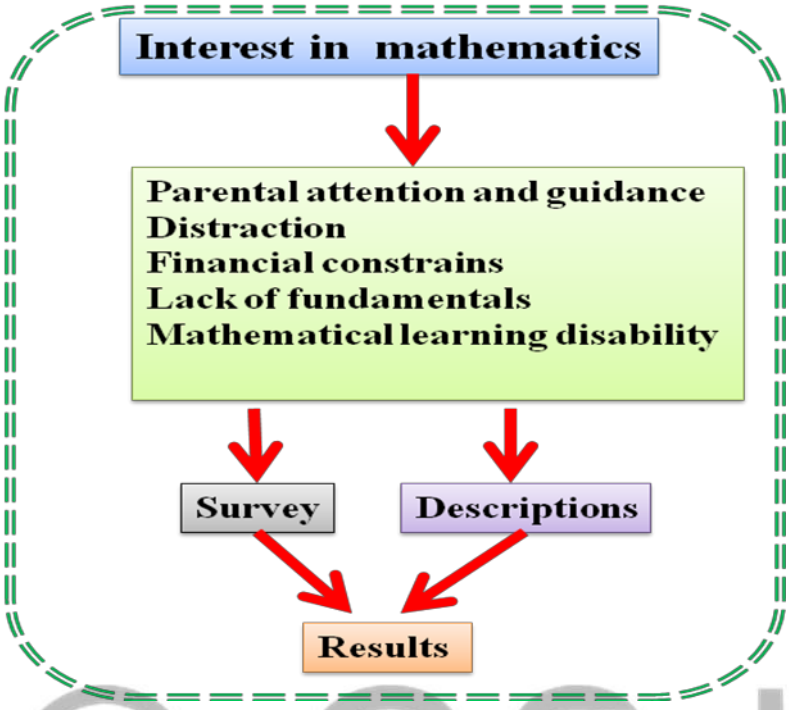

Figure 1 flowchart for the proposed research study

Several factors play an important role in analyzing the interest in mathematics which has the following meanings[24-25]:

a) Interest in mathematics refers to "the willingness towards doing things" and in this context, interest in mathematics means "willing to study mathematics in and above graduation level".
b) Lack of fundamentals refers to have weak knowledge (below the average) in mathematics. It can be due to the structure of curriculum of mathematics of a nation which is done through experts and policymakers.
c) Parental attention and guidance refers to the supervision and motivation by the parents to their children in their studies. The role of teachers in shaping student attitudes toward the subject and the involvement of parents in their children's education cannot be ignored. When parents participate in their child's education they are encouraged to study mathematics and are more likely to have positive attitudes toward it.

d) Distraction refers as diversion of attention of an individual or group from the chosen object of attention onto its source. Distraction is caused by one of the following: lack of ability to pay attention; greater interest in something other than the object of attention.
e) A financial constraint refers to the ability of the guardian to afford in education. The role of socioeconomic status (SES) should not be ignored. This factor is also indirectly affecting the students to take advanced courses and pursue the career in mathematics. Furthermore, the financial factor also differs in ethnicity in Nepal's context.
f) Mathematical learning disability (MLD) refers to the incompetency in the students. It refers to those who tries hard to learn but cannot grip its concepts.

3. Results and Discussion

The findings of this study were mainly based on the quantitative data gathered from the respondents using a developed set of questionnaires. This section discussed about the results from the descriptive analysis. The number of sample was 365 for this study. The mathematics interest survey was filled by the students above grade twelve. This group marks the end of higher secondary school and students have had an exposure to give their views in various form. By this study level, they also have a range of experiences with societies, cultures, activities, family and occupations which they can associate in meaningful ways. They are able to figure out the questions, make own judgments, express their thoughts and can voice their opinions freely. These will eventually an appropriate sample for surveying ideas through verbal or written mode. Of the 365 surveys, 335 surveys were returned for evaluation. The completed surveys were sorted based on ethnicity. Ethnic groups that contained 4 or less student completed surveys per class were discarded, as were incomplete surveys. As a result, out of the 335 returned surveys, 84 were separated. Among them 41 samples were of non ethnic group and rest were discarded due to the conditions mentioned above, resulting in a sample size of 251. The sample of 251 surveys (from all five schools) was entered individually into a Microsoft Excel spreadsheet for analysis.

Figures 2 and 3 show the factors influencing the interest in studying mathematics. Huge number of students felt the concern in lack of fundamentals (31% and 105) followed by financial constraints (27% and 94) and lack of parental attention and guidance (22% and 75).

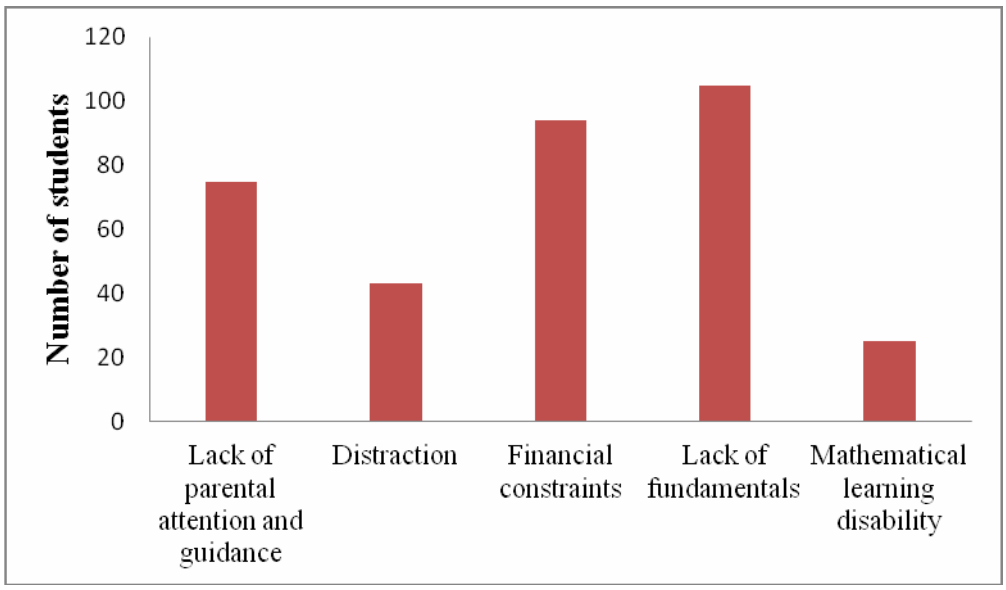

Figure 2 Distribution of students during the survey

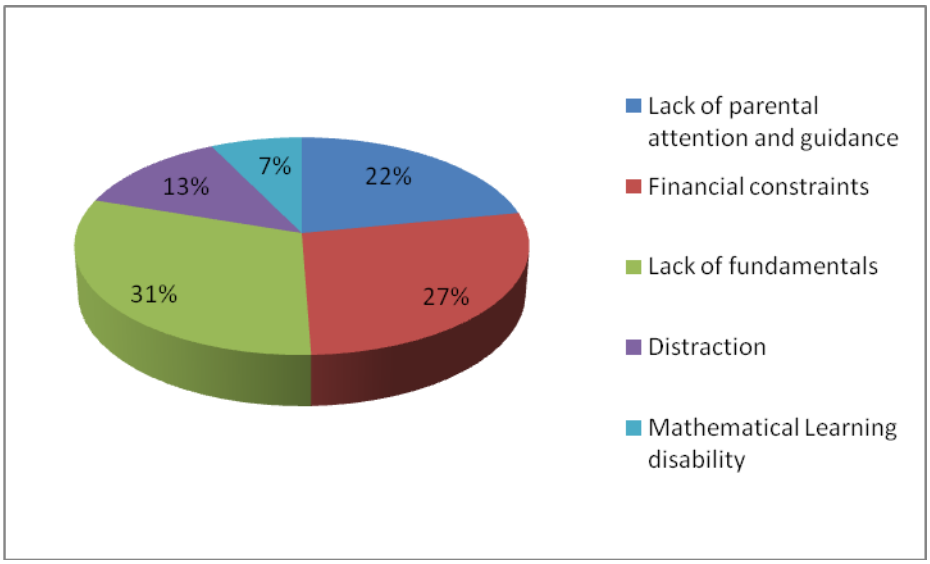

Figure 3 Factor influencing the interest in mathematics

There are a lot of other factors affecting student's interest in mathematics. It is noted that student's intellectual- mathematical motivations and social-personal motivations also influence the students' attitudes in learning mathematics. These results can be shown in Table 1. Here the most influencing factors are dominated by financial constraints and lack of parental attention and guidance. The reasons were due to socioeconomic status and education among students family.

During survey, the students were allowed to tick all the best options that they felt difficulty in studying mathematics (the choices were not restricted to single options). The total result showed more than 251 because some students have identified two or more variables as their cause for not liking mathematics. So there were some students in common who felt lack of parental attention

and guidance, lack of financial constraints and lack of fundamentals as a cause for losing interest in mathematics.

Table 1 Factors responsible for interest among students

S.N	Lack of parental attention and guidance(A)	Financial constraints(B)	Lack of fundamentals(C)	Distraction(D)	Mathematical Learning disability(E)	Number	Percentage
1	√	√	√	-	-	12	4.7
2	√	√	-	-	-	28	11.1
3	√	-	√	-	-	33	13.1
4	-	√	√	-	-	17	6.7
5	√	-	-	-	-	75	29.9
6	-	√	-	-	-	94	37.4
7	-	-	√	-	-	105	41.8
8	-	-		√	√	43	17.1
9	-	-	-	-	√	25	10

Similarly, figure 4 shows the multiple factor responsible for lack of interest in mathematics among students in Venn diagram. Those factors are related to connecting math topics with real life, using materials in teaching math, teachers' personality, teachers' content knowledge, teachers' classroom management and students' opinion about math course. Many students have no interest in mathematics because they are given the impression that it is a difficult subject. The study has shown that the class environment also plays a significant role in creating positive attitudes towards any subject. Creating a positive and encouraging classroom experience also depends upon the teacher. All these questions deal with just a few aspects that make up the classroom environment. Answering these questions could help educators to understand how to make mathematics more accessible and more inviting to our students and hopefully encourage our students to pursue advanced mathematics courses in schools and colleges**.** The interesting fact was that all the students who pointed mathematical learning disability as the cause of losing interest also felt distraction as the cause.

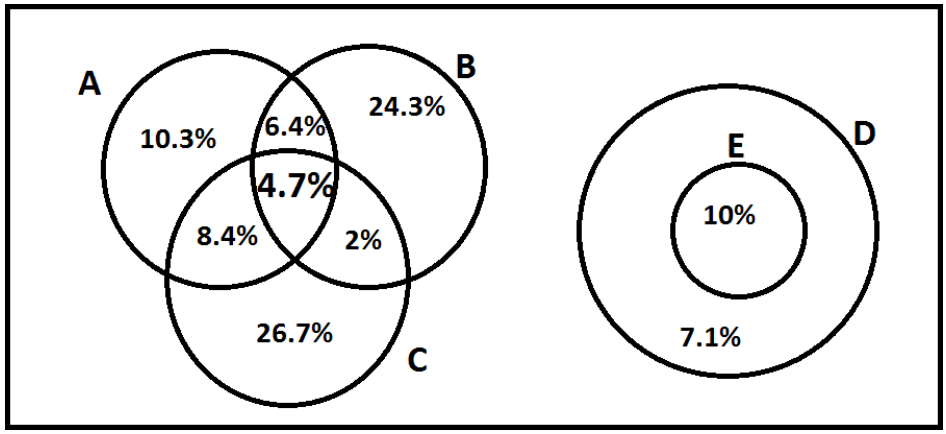

Figure 4 Factor associated for interest in mathematics in Venn diagram

The interesting fact was that all the students who pointed mathematical learning disability as the cause of losing interest also felt distraction as the cause.

As much as teachers are role models for students, the same holds true for parents and family members. This study shows that family encouragement was significant in influencing students positively toward mathematics. Families do not have to know or understand a lot about the subject in order to encourage their students to take an interest in mathematics. Parents can encourage their children to become involved in mathematics clubs and competitions at their school and performing quizzes at home. Parents often forget how much influence and impact they have on their children and often leave the teaching and academic support to teachers. It is time for parents and teachers to come together and work as a team in promoting mathematics. Teachers can send students home with some problems to try at home with family members. And conversely students should be encouraged to share informal learning experiences with his or her class. This study supports the notion that the classroom environment, informal learning experiences, and family encouragement are all important when it comes to influence positively students to pursue mathematics. Likewise, Table 2 and figure 5 show the percentage of students and number that has interested in mathematics in the basis of ethnicity and non-ethnicity Here, the non-ethnic group has 7.3 % where as ethnic group corresponds to 0.8 % of the total percentage.

Table 2 Percentage of interest in mathematics among groups

S.N	Groups	Total number of students	Interested Students	Interested %
1	Non ethnic group	41	3	7.3
2	Ethnic group	251	2	0.8

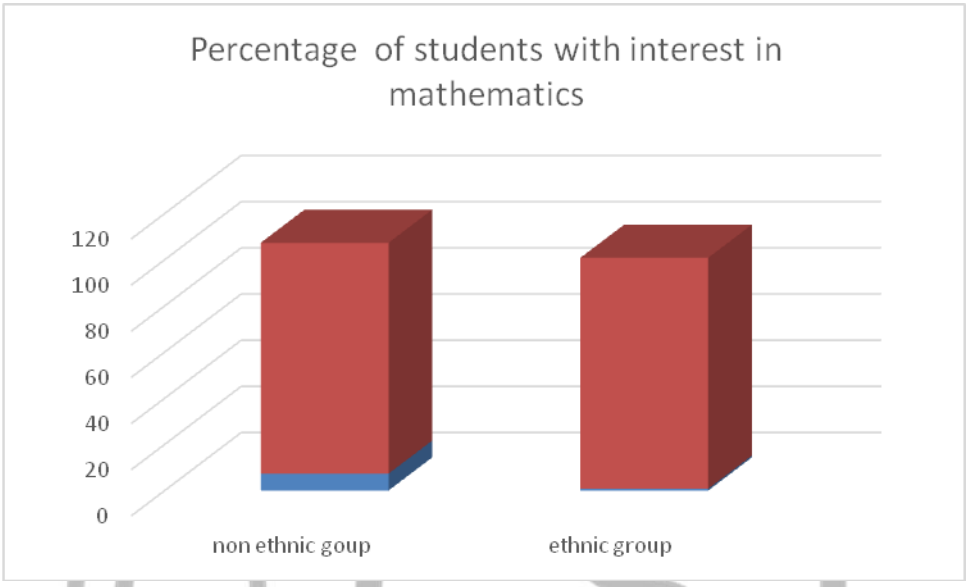

Figure 5 Number of students group interested in mathematics

4. Conclusions

The aim of this study is to evaluate the interest level in mathematics among two groups namely ethnic and non ethnic students group in Nepal. The study was conducted in regards to various factors that influence the interest in mathematics. The five factors such as lack of fundamentals, parental attention and guidance, distraction, financial constraint and mathematical learning disability were taken into consideration. The survey was carried in order to know the students interest mathematic. The most dominating factors for losing interest in mathematics were fundamental knowledge on mathematics and parental attention and guidance. In conclusion, it was found that only 0.8 % ethnic group students were interested in mathematics. Many students may then continue to fall behind the standard of mathematics achievement and lose their interest in mathematics; they eventually give up on learning mathematics. In fact, students in Nepal generally have lower interest in learning mathematics and this is very severe problem. . It should be noted that students in every classroom possess different abilities and hence demonstrate different achievements. The low-interest problem for almost all students in Nepal is usually accompanied by low motivation.

The following are the recommendations given to create interest in mathematics to all the ethnic groups. Teachers must use modern teaching methodologies that "contextualize" the mathematics in real life .Teachers need to be concerned why the particular student is not able to focus on the mathematics. Finally teachers of mathematics need convince the parents that they should focus on their child's activity in mathematical learning process.

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Appendices

Appendix A: Science Interest Survey

It shows the mathematics Interest Survey that was distributed to all participants of this study. Teachers of the participants handed out the mathematics interest survey and instructed students on how to fill out the survey forms. Surveys were completed in class and collected by the teachers. Teachers either mailed or hand delivered completed surveys to the researcher.

Mathematics Interest Survey

Name;----------(optional) **Caste:** Brahmin /Chettries □ or others:_____
(compulsory)

Level:_____ **Please check your race/ethnicity or describe by the box marked "other."**

Directions: Read each statement. Circle the number that describes how you feel about each statement. From

1 – strongly disagree 2-disagree 3-don't know 4-agree 5- strongly agree

1. My family has encouraged me to study Mathematics.	1	2	3	4	5
2. My friends do not like Mathematics.	1	2	3	4	5
3. My Mathematics teachers encourage me to do my best.	1	2	3	4	5
4. People in my family are not interested in Mathematics.	1	2	3	4	5
5. My Mathematics teachers have encouraged me to learn Mathematics.	1	2	3	4	5
6. My friends view Mathematics as nerdy.	1	2	3	4	5
7. My family is enthusiastic about a Mathematics career for me.	1	2	3	4	5
8. My friends do not like to watch Mathematics programs on T.V.	1	2	3	4	5
9. My family is interested in the Mathematics courses I take.	1	2	3	4	5
10. The topics taught in my Mathematics class are boring.	1	2	3	4	5
11. My Mathematics classroom has interesting equipment.	1	2	3	4	5
12. We do not use most of the equipment in our Mathematics classroom.	1	2	3	4	5
13. My Mathematics teachers are enthusiastic about Mathematics.	1	2	3	4	5

14. I cannot concentrate in mathematics class	1	2	3	4	5
15. My parents cannot afford to pay for mathematic books	1	2	3	4	5
16. I need to do job rather than to study	1	2	3	4	5
17. I do not used to concentrate in mathematics class	1	2	3	4	5
18. Lower level mathematics was a difficult one	1	2	3	4	5
19. Other than Mathematics were interesting in lower level	1	2	3	4	5
20. I cannot grip the mathematical concepts	1	2	3	4	5
21. The mathematics class is expensive in Nepal	1	2	3	4	5
22. Mathematics books are expensive to buy	1	2	3	4	5

Do you like mathematics ?

☐ Yes ☐ No

What word best describes your current interest in Mathematics? (please circle)

☐. dislike it ☐. not really interested ☐. not sure ☐. interested ☐. very interested

Please tick the reason why are you do not like mathematics (Tick **at most three** options)

- ☐ **Lack of parental attention and guidance**
- ☐ **Financial constraints**
- ☐ **Lack of fundamentals**
- ☐ **Distraction**
- ☐ **Mathematical learning disability**

Appendix B: Mathematics Interest Survey Subscale Statements

Appendix B shows the sets of statements organized by subscale that together comprised the Mathematics Interest Survey.

Mathematics Interest Survey – Subscale Statements

Parental attention and Guidance

1. My family has encouraged me to study Mathematics.

2. People in my family are not interested in Mathematics.

3. My family is enthusiastic about a Mathematics career for me.

4. My family is interested in the Mathematics courses I take.

Distraction

1. I cannot concentrate in mathematics class
2. My friends do not like Mathematics.
3. My friends do not like to watch Mathematics programs on T.V.
4. The topics taught in my Mathematics class are boring.
5. Other than Mathematics were interesting in lower level

Mathematics learning disability

1. My Mathematics teachers encourage me to do my best.
2. My Mathematics teachers have encouraged me to learn about Mathematics.
3. My Mathematics classroom as interesting equipment.
4. We do not use most of the equipment in our Mathematics classroom

Lack of Fundamentals

1. I cannot grip the mathematical concepts.
2. My Mathematics teachers are enthusiastic about Mathematics.
3. I do not used to concentrate in mathematics class
4. Lower level mathematics was a difficult one.

Financial Constrains

I. My parents cannot afford to pay for mathematic books
II. The mathematics class is expensive in Nepal
III. Mathematics books are expensive to buy
IV. I need to do a job rather than to study