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Mathematics as a Carrier Desire: A Survey of Students among Mechi Multiple Campus

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Abstract

The purpose of this study was to find out how Mechi Multiple Campus students feel about mathematics as a career option. The study was conducted using a descriptive research approach. A structured questionnaire was used to obtain primary data from a random sample of 435 pupils. To arrive at a conclusion, the data was processed using the mean and standard deviation. The findings suggest that pupils were not interested in pursuing mathematics as a career. Students would rather pursue professions in disciplines other than math. They were also hesitant to spend adequate time, effort, and determination to improve their mathematic skills.

Keywords: Career, career choice, mathematics, bachelor level

Introduction

In the current century, mathematics is essential for everyday living. It is challenging or even impossible to live a life without using mathematics. There is no part or events in life where mathematics is not used. The simplest form of mathematics, such as counting, addition, subtraction, multiply, and divide, were used in each step of each of our days (Cockcroft, 1986). Despite the pervasiveness of mathematics, majority of the people in the society do not choose to become a mathematician. Though mathematics education itself is a widely covered and taught subject in Nepalese universities, the public and private sector endeavour to solve, develop and enhance the mathematics skill to the students is negligible. The number of job opportunities that explicitly use mathematics is not escalating in the domestic labour market.

An Individual's career choice depends on the number of things. A part of the career choice depends on the family tradition of the individual family (Thomas, 2006). Along with that, several factors like the fulfilment of the need for security and safety (Robbins, 2019), individual's expertise, level of autonomy in work, balanced work-life and opportunity for achievement and advancement in their work (Sjaastad, 2012) also has an impact on the career choice of an individual.

Purposeful education enhances students' mathematical efficacy by providing them attitudes, knowledge, and skills to cope with the complexities embedded in mathematical activities. Mathematics education enhances students' creativity by giving them the experience of mastery, role models, social persuasion, and support by involving them in hands-on learning activities and running simulated or real-life situations. Hence, improving students' mathematical skills enables them to put more effort over a longer time, persist the challenges, and develop plans and strategies to achieve higher career goals. The objective of present study is to analyze college-level students' perception of mathematics at Mechi Multiple Campus.

Literature Review

Researchers believe that career desire is similar to other personality traits such as locus of control or self-efficacy, although they were different in some aspects. 'Locus of control' is the overall belief in ones' power over the outcomes of actions (Boyd & Vozikis, 1994). In contrast,

self-efficacy is the solid personal faith in skills and abilities to initiate a task and lead it to success (Bandura, 1997). Self-efficacy, rather than objective knowledge, has been found to strongly impact one's motivation to demonstrate their behavior in their subject area (Markman, Balkin & Baron, 2006). Unlike other personality traits of studying mathematics, Hollenbeck & hall (2004) postulated that self-efficacy is affected by contextual factors such as education and past experiences. More interestingly, career aspiration is one of the core components of an individual's intention and is understood chiefly as feasibility, although there were subtle technical differences between them (Ajzen, 2002; Segal, Borgia & Schoenfeld, 2005).

Several factors tend to affect the propensity of students to not choose mathematics as their career choice or significant study subject. Words such as anxiety, confidence, frustration, and satisfaction were frequently related to mathematics study and application (McLeod, 1992). According to National Research Council (2001), mathematical proficiency has proposed five strands. They include:

- Conceptual understanding: The ability of the students to understand mathematical concepts, operation, and relations.
- Procedural fluency: The ability of the students to flexibly, accurately, efficiently, and appropriately solve math problems.
- Strategic competency: This includes the ability of the students to formulate, represent, and solve mathematical problems.
- Adoptive reasoning: It is the capacity of the students for logical thought, reflection, explanation, and justification.
- The productive disposition: This is focused on the habitual inclination of the students to see mathematics as sensible, practical, and worthwhile, coupled with a belief in diligence and efficacy.

Given all those requirements for mathematical ability proposed by National Research Council and other researchers, it would seem that mathematics anxiety is monolithic; however, Perry (2004) mentions different types of mathematics anxiety in undergraduate students ranging from moderate and variant math anxiety, long-term math anxiety which began as the result of teacher's action, anxiety caused by the mechanical mode of teaching and the lack of understanding for learning mathematical concepts. Test anxiety, temporal anxiety, numbers, mathematical operations anxiety, and real-life math situation anxiety (Garcia, Munoz and Mato, 2016) were related to mathematics in secondary school level students.

The last two decades have seen a remarkable increase in attention to the mathematics education of young children. Recent mathematics education curriculum and standards documents address the mathematical topics and processes that ought to be part of the mathematics education of young children. For instance, in the NCTM's recent paper: Research suggests that the most critical feature of a high-quality educational environment is a knowledgeable and responsive adult (Bowman, Donovan & Burns, 2001; Darling-Hammond, 1997). There is consistent evidence that most teachers of young children have limited knowledge of mathematics and the thinking strategies of mathematics in early childhood (Clements, Copple & Hyson, 2002, Copley & Padron, 1999). These factors pose some hindrance and serve as their reason for selecting mathematics as a career choice.

Materials and Method

The research collected the perception of the students studying in Mechi Multiple Campus, on selecting mathematics as a career choice. The perception was collected through a self-

administered, structured questionnaire. Microsoft Excel software was used to process qualitative data collected from the questionnaire to induce new findings or compare with the existing theory in mathematics as a career choice. However, finding out the causes of the relationship were not within the study objectives.

The research identified the current status of the population under study and discussed what exists concerning the title of the research. Data were collected from the respondents in the entirely natural and unchanged environment, and at a point in time. Hence, there was a reliance on existing differences somewhat changed the following intervention, and there was no time dimension. Inferences were drawn from existing differences between students under study. Thus, the study was cross-sectional qualitative research which used an inductive approach for the descriptive outcome.

Simple and direct questions were included in the close-ended-structured self-administered questionnaire to avoid any confusion on the part of the respondents; each question was based on some specific scenario relating to the career choice of the respondents. Such scenario-based questions helped respondents relate themselves to hypothetical situations in career choice, and thus, it was easier to mark their responses. Since respondents' orientation may be reflected in their answers, they were asked direct questions covering all the shortlisted behavioral factors.

The questionnaire included a different section for each of the objectives so that respondents where at ease while filling up the questionnaire. The first section collected the personal and demographic information of the respondents. This information was helpful for the researcher to draw some conclusions based on the demographic profile of the respondents. The second section had questions to rank different factors of career choice. This was designed to conduct the vertical analysis of the other variables that created specific career choice decisions. In the third section, the sample respondents were given scenario-based questions. They were asked to mark their response in a range of Likert scale questionnaires of 5 points where 1 was for strongly agree, 2 for agree, 3 for neutral, 4 for disagree, and 5 for strongly disagree. The respondents ticked the most appropriate response to each statement as per the request.

The total population of the study was 1200 students; thus, the sample was strict to at least 384 students. The lower boundary for sample selection was based on the findings of Kreajcie & Morgan, 1970 who suggested 384 to be representative sample for a larger population. A pilot study involving 50 respondents was carried out through google docs to check, correct and rephrase the questionnaire so that it was understandable by respondents.

To ensure that the questionnaire reflected the accurate picture, only those full-time students who were regular to the college were selected as the respondents for the study. After the response from those respondents, the researcher made changes in terms of eliminating, adding, or rewording some of the items included in the questionnaire.

Self-administered structured questionnaires were distributed among 500 students of Mechi Multiple Campus, Nepal. Finally, the responses from 435 (87% response rate) observations were processed and analyzed using Microsoft Excel software.

Descriptive statistics was used to summarize the collected data as well as to describe and understand its essential feature to facilitate easy comparison. It includes the calculation of frequency and percentage schedules. The central representative value of entire data sets was drawn using mean and standard deviation to measure the dispersion. Further, graphical presentations have been provided for increased clarity and understandability.

Accordingly, a benchmark score for the mean value was obtained by calculating the mean values attached to the 5-Likert scales. The subsequent benchmark value of the mean was 3.0. The

value serves as a basis for acceptance or rejection of the items in the questionnaire. As a result, any item with a standard greater than 3.0 was rejected, and any item with a mean lower than or equal to 3.0 was accepted (Abah, Age, & Agada, 2019).

Cronbach's Alpha tested the data to measure the survey instrument's reliability and internal consistency as identified from factor loading. In addition, the Cronbach's Alpha also assisted in determining how much variation in scores of different variables was attributable to chance or random errors (Selltiz, Wrightsman, & Cook, 1976) and estimate the reliability of the participant's response to the different dimensions of the variables (Helms, Henze, Sass, & Mifsud, 2006). The result indicated that the Cronbach's α value of the responses ranged between .72 and .86, which, according to Nunnally & Bernstein (1994), is greater than the standardized value, i.e., 0.70; hence, the questions for survey instruments were valid and reliable. The scales used in survey instruments were uni-dimensional.

Presentation and Analysis

The total distributed questionnaire was 500. Among the 500 questionnaires, 8 questionnaires were never returned and 57 questionnaires were partially filled. Hence, the response rate was 435 resulting in a response rate of 87 per cent. The majority of the respondents were female, i.e., 87 percentages.

Table 1

Questionnaire Distribution Pattern and Response Rate

Name of the sample organization	Questionnaire Distributed	Valid Questionnaire	Response Rate (%)
Mechi Multiple Campus	500	435	87

Source: Data from questionnaire

The reliability of each set of constructs had a Cronbach α value ranged between 0.72 and 0.86. The measurement of items in the survey questionnaire was based on 5-point Likert scales, with 1 demonstrating "strongly agree" to 5 showing "strongly disagree." Accordingly, a mean score above 3.80 was considered high, 3.0-3.79 was considered as moderate, and below 3.0 was considered low (Zaidaton & Bagheri, 2009).

Respondent's Profile

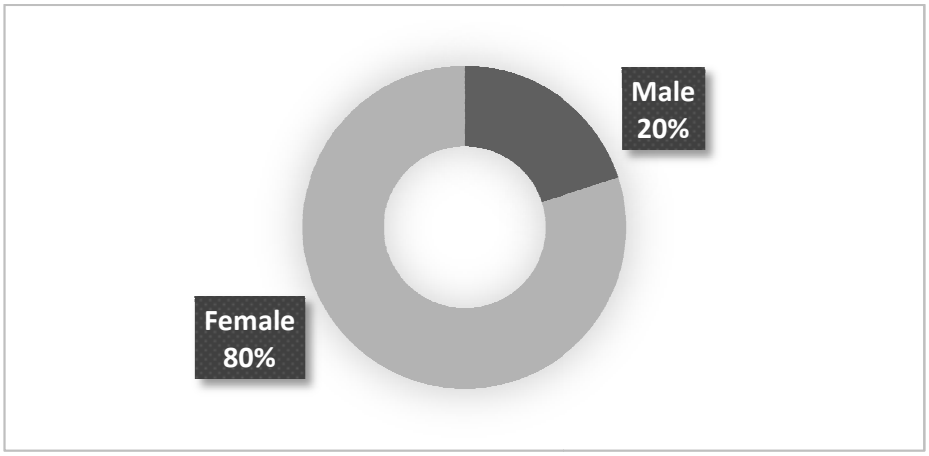
The respondents' profile analysis covers the analysis of their profile in terms of gender and Age. Each of them has been explained as follows:

Gender of Respondents

Figure 1 depicts the graphical presentation of the gender of the respondents taken under the study. Out of the 435 respondents, 20 per cent represent male students, and 80% represent female students. Therefore, most of the respondents under the investigation represent female students, implying a female-dominated career choice trend.

Figure 1

Respondent's Profile Concerning Gender

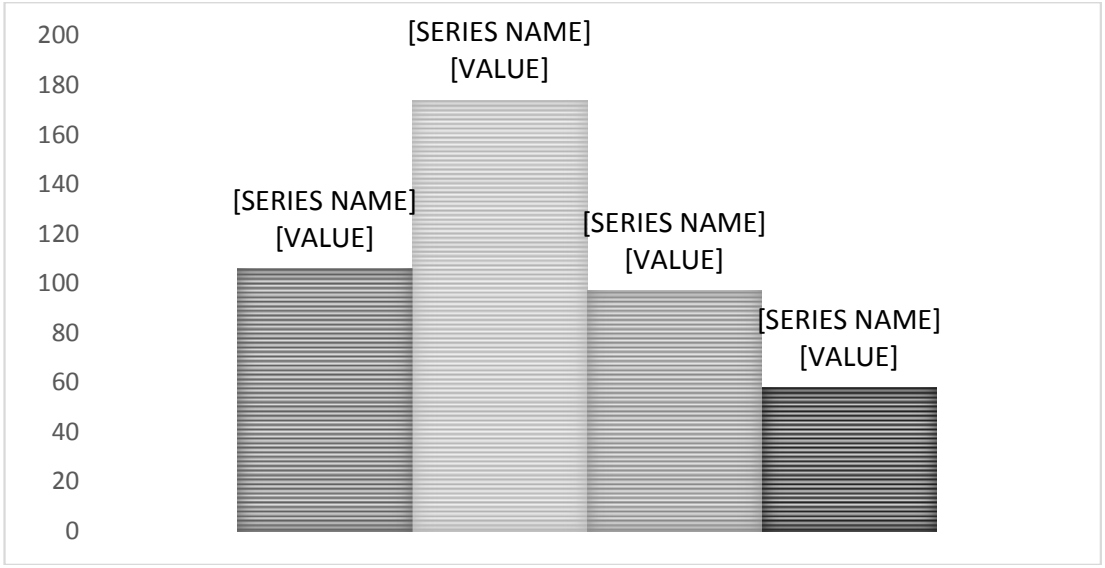


Age of Respondents

To analyze the age of the respondents, questionnaires were distributed as presented in the figure below. The 40%of respondents represent the age group 19-20 years. The 24.37% population group was between 16-18 years, the respondents of the age group 21-22 years were 22.3%, and those above 22 years were 13.33%. The summary statistics of the age of respondents are shown in Figure 2.

Figure 2

Respondent's Profile Concerning Age Group



Career Desire of college Students

To know whether students choose mathematics as their career, the career choices were measured in terms of their perception towards mathematics and their willingness to devote time and effort in the field. Table 3 represents the descriptive statistics of the component mathematics as a career choice. The descriptive statistics were analyzed to identify the impact of each variable in choosing mathematics as a career.

A benchmark score of the 5-point Likert scale was obtained by calculating the mean of the subsequent values attached to the scales. The benchmark value of the mean was 3.0. The value

served as a basis for acceptance or rejection of the items in the questionnaire. As a result, any item with a standard greater than 3.0 was rejected, and any item with a mean lower than or equal to 3.0 was accepted (Abah, Age, & Agada, 2019).

Table 3

Mathematics As a Career Itention of College Students

Items	Mean	SD	Remarks
1. I will choose my career as a mathematician.	3.46	1.01	Rejected
2. I prefer to be a mathematician rather than another.	3.39	1.03	Rejected
3. I am prepared to do anything as a mathematician.	3.36	1.02	Rejected
4. I am ready for every effort in math subject.	3.51	1.04	Rejected
5. I'm determined to teach mathematics.	3.83	0.97	Rejected
6. I will spend my career in mathematics.	3.65	1.02	Rejected

Source: Data from questionnaire

Finding and Discussion

The research was conducted to check whether mathematics was a career choice of Bachelor level students at Mechi Multiple campus. However, the study result was highly dominated by female participants representing 80% of the total participants and students from age group 19 to 20, representing 40% of the total respondent. Thus, these factors should be considered while accessing the findings and discussing the results.

The result shows that the students were not inclined to make mathematics their career no matter how pervasive and essential mathematics was in daily life. The response to the question relating to choosing their career in mathematics was similar to the previous finding of Agular et al. (2013). The result also shows that students prefer to pursue their careers in fields other than mathematics. Because they were not willing to pursue their career in mathematics, they were also not willing to devote sufficient time, effort, and determination to develop themselves in mathematics.

This result may be due to the influence of family members and their relatives in the students' career choices (Adeyemi, 2012; Agular et al., 2013). The parents' positive response towards mathematics careers seems to persuade the students to choose mathematics as their career choice (Abah, et al., 2019). Naturally, when the students do not select mathematics as a career, the other dimensions relating to their willingness, devotion, and determination seem to suffer. Another set of studies identified that role models also impact the career choice of the students. When family support and role models were against the career, it was difficult for the majority of the students to pursue their career in mathematics (Sjaastad, 2012).

Other research has suggested that confidence in their intellectual capacity (Eccles, 2007), the quality, teaching methodology and behavior of mathematics teachers in the class (Kniveton, 2004; Mudhovozi and Chireshe, 2012), and academic interest of the students (Edwards and Quinter, 2012) were the significant factors that affect the career choice of the students.

Conclusions, Policy Implication, and Limitations

The findings of the study conclude that the students were not willing to make mathematics as their career choice. They also did not prefer math over other subject and were not willing to put an effort to do the hard work to develop their career in mathematics. In summary, they were not inclined towards developing their career in mathematics and put an effort to develop and grow in the career. However, few things should be noted while accessing the result of this study. First,

the majority of the respondents in the study were female students, second, they were already at bachelors' level, thus some of them had already made their career decisions, third, all the dimensions affecting the career choice have not been studied and, finally, only mean and standard deviation analysis were carried out to reach to the conclusion. These things served as a limitation of the study.

The research has substantially expanded the understanding of whether college-level students intend to choose their career in mathematics. This in turn suggest that, though mathematical calculations were one of the most widely used expressions in daily life (Cockcroft, 1986), study of mathematics as a core career focus may not be viable project for any business, schools or government. This also implies that there was a general disliking about the mathematics career. However, the literature suggests that this tendency largely depends on the focus of the family, focus of the society and the mathematics teachers in schools (Abah, Age, & Agada, 2019). Hence, the policy implication is that to change the career focus, the social narrative and the resource person's approach needs to be addressed.

Furthermore, the current study adds to the scarce literature in the current field. It also establishes a base for further research in the related field that focuses explicitly on the factors that impact the career choice, the impact of the family and peer pressure on the career choice, and the importance of role models and teaching methodology in the career choice of the students.

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Appendix
Questionnaire

Namaste, I am Binod Sah, Faculty Head-Mathematics, Mechi Multiple Campus, Bhadrapur Jhapa, conducting research entitled "Mathematics as a Carrier Desire among Students of Mechi Multiple Campus".

The following questionnaire has been presented to you to collect relevant information from you students. The collected data will be kept confidential and will only be reported as a summarized data and will not contain any identifiable individual data. Your participation in this study is entirely voluntary. It will take only up to10 minutes at most to fill the questionnaire. Please provide the most accurate and valid information.

Section I: Personal Information

This section is related with your personal information. Please provide the most appropriate answers.

1. Name: ……. (Optional)
2. Gender (Please tick (√) in the most appropriate box)
   Male Female Others
3. Age (Please tick (√) in the most appropriate box)
   Below 18 Years
   18 - below 23 Years
   23 - below 28 Years
   Above 28 Years
4. What is your faculty?
5. How long have you been studying in Mechi Multiple Campus? (in Years)

Section II: Likert Scale

This section deals with your perception towards mathematics as your career choice. Please tick the response that you think is most appropriate to each statement. The questions are presented in Likert scale of 5 points. The explanation of the points are as follows:

1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

1. Herd Behavior

S.N.	Statements	1	2	3	4	5
1.	I will choose my career as a mathematician.					
2.	I prefer to be a mathematician rather than another.					
3.	I am prepared to do anything as a mathematician.					
4.	I am ready for every effort in math subject.					
5.	I'm determined to teach mathematics.					
6.	I will spend my career in mathematics.					

Thank you for providing your valuable time and opinion.