GENDER ISSUES IN MATHEMATICS AT SECONDARY LEVEL

A THESIS BY

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Letter of Certificate

This is to certify Mrs. **Himkala Rana**, a student of the academic year **2018/2019** AD with thesis number **167** , Exam Roll No. **7428270**, Campus Roll No. **382,** and T. U Regd. No. **9-2-411-15-2014** has completed his thesis under my supervision during the prescribed by the rules and regulations of T. U Nepal. The thesis entitled "**Gender Issues in Mathematics at Secondary Level"** embodies the result of his investigation conducted from **2020/2021** at the Department of Mathematics Education, University Campus, Tribhuvan University, Kirtipur, Kathmandu. I recommend and forward that his thesis is submitted for evaluation to award the Degree of Master of Education.

.....…….....

Prof. Dr. Bed Raj Acharya

(Head)

Date:

LETTER OF APPROVAL

Thesis Submitted

By

Himkala Rana

Entitled

"Gender Issues in Mathematics at Secondary Level"

has been approved in partial fulfillment of the requirements of the Degree of Master of Education.

Viva-Voce Committee	**Signature**
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Date:

RECOMMENDATION FOR ACCEPTANCE

This is to certify that Mr. **Himkala Rana** has completed his M. Ed. thesis entitled **"Gender Issues in Mathematics at Secondary Level"** under my supervision during the period prescribed the rules and regulations of Tribhuvan University, Kirtipur, Kathmandu, Nepal. I recommend and forward his thesis to the Department of Mathematics Education to organize the final viva-voce.

.....……..…….....……

Mr. Krishna Prasad Bhatta

(Supervisor)

Date:

DEDICATION

This thesis is dedicated to my mother **Mrs. Pabitra Rana**, my father **Mr. Jyoti Bahadur Rana,** and my brother **Mr. Ram Rana** whose love, support, and encouragement have enriched my soul and inspired me to purpose and complete this research.

DECLARATION

This thesis contains no material which has been accepted for the award of another degree in any institution. To the best of my knowledge and belief, this dissertation contains no material previously published by any authors except due acknowledgment has been made.

2021

Defense Date:

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…….

Date Himkala Rana

ABSTRACT

The main concern or area of this study was “Gender issues in mathematics: A case study”. The objectives of the study were to explore the problem of gender issues in mathematics and also explore the behavior of mathematics teacher toward students. The descriptive case study approach was adopted to conduct the study under the qualitative research design. This study was bounded only in Arghakhanchi district and also this study was based only on Shree Pawar Secondary School, Sitganga Municipality 14, Arghakhanchi. In-depth interview, classroom observation were used as tools for data collection. This study was conducted with the four mathematics students as case study and also two mathematics teachers. The researcher observed classroom for 4 days and interviewed with related students, mathematics teachers. Collected information were analyzed and interpreted with the help of empirical and theoretical review.

This study that, Girls and boys are biologically different but their roles, status, position, responsibility are somewhat the same. In our male domain society, there is a different way to see the female from the point of view of mathematics education. There is a belief that female is not able to grasp technical subjects such as mathematics science and therefore is unable to teach. While interacting with male and female teachers and male and female students at secondary level. And summing up their view. This subject to male domain in the society. As our Nepali society is rooted in male oriented society, no matter how many children are equal, they do not seem to be equal in behavior. Due to the mentality that the daughter has to do the housework, there is less time to study as she has to do the housework, so there is less focus on reading but in school, boys and girls were treated equally. It was found that the teachers helped the students with the

idea that the girls should go further. Despite the same treatment in the school, the achievement of the girls was found to be less than that of the boys.

Our country Nepal is male oriented country. Sons are given priority over daughters the daughter sending to government school and sons to private schools is still not over. In this study, I concluded that there are main factors which are gender issues in mathematics at secondary level students such as behavior of teachers, achievement of students in mathematics, educational system, poor management, interest of learner in mathematics, educational environment at school and home and time schedule etc.

LIST OF ABBREVIATION

B.Ed. = Bachelor of Education

CBS = Central Bureau of Statistics

M.Ed. = Master of Education

S.L.C. = School Leaving Certificate

T.U. = Tribhuvan University

UNESCO = United National Educational Scientific and Cultural Organization

UNICEF = United Nations International Children Emergency Fund

CONTENTS

CHAPTER I.

Background of the study

Gender issues have been discussed in many areas for example, management and administrations, social works, development polities, education etc. " gender is defined as a network of beliefs, personality, traits values, behavior and activities differentiating women and men through a process of social construction that has a number of distinctive features" (UNDP 2006. P. 82).women and men are biologically different but their roles, status, positions, and responsibilities. And relationships ate equal. Despite the reality, extended between male and female concerning the gender – based factors in our society. The society treats males and superior and women given weaker of inferior positions, although some changes can be felt with women in the position of president, chief justice, speaker of the house, the situation is not favorable for women in mint aspects. The patriarchal family structure has been common in Nepal, where females are dominated every aspect of life considering men as superior to female.

(Gawain, 2006, as cited in Bhandary, 2017). "The socialization of girls and boys shape their understanding of gender role and worldview. The deep – rooted socio cultural norms and practices of the patriarchal system determine the roles of boys and girls" (Thapa, 2-12, p. 37) it seems that society has marked the gender based roles of male and females. The difference between their physical and biological aspects has been concerned without social phenomena. It has created a big gap in relation to male and female.

The principle of equality is related to providing equal rights to both male and female. Gender is considered to achieve when women and men enjoy the same rights and opportunities across all sectors of society that should include economic

participation and decision – making (Maxwell, n. d.). The dealing with both male and female should not be different as both do have equal aspirations to lead the society and the needs of women and men should be equally valued, favored and addressed too. Although people talk about equal rights between male and female and constitution also guarantees such rights, the equalities has not been realized get in practice it is also a case in the area of teaching learning mathematics in Nepal. There are various gender issues related to the realm of mathematics teaching and learning at school and in the collage as well. Among these issues, in this paper. I have especially focused on a few female related issues about teaching and learning mathematics at the secondary level.

In my journey of learning mathematics from school to University level. There were minimal number of girl student in the classroom. There is still a misconception that mathematics is a difficult subject among students and parents (Gafoor, and kurukkan, 2015). Such misconception has severely affected women enrolment and participation in mathematics education in Nepal. Mathematics is normally factored and controlled by men (chipman, 2005). It is taken as a complicated subject for women. I have experienced and seen in the capacity of female mathematics educator that learning mathematics is more challenging for girls not because it is difficult by nature but by the social stigma of mathematics in general. As a result, there was a very smaller number of females students compared to males.

The participation of women all over the world is very low in economic, intellectual, social and political opportunity. One of the reasons could be due to the less involvement of women in education in comparison to men. Even if they were not permitted or simply discouraged to become intellectuals in this sophisticated and complex subject. Amelink and teach (2012, p, 2) described that " the views of

mathematics by females and shaped in part by gender based stereotype which convey misconceptions that differently innate mathematical abilities existing between males and female.

In Nepal mathematics is regraded as one of the tough subjects and less interesting ones. Participation of females in higher education in the mathematics department is very low as compared to males. Girls prefer to study “easier “subjects such as biological science, education, sociology, economics, home science and mathematics. They get married before completing bachelors and master's degree and leave their further studies. They do not tend to continue and make their career on those subjects. Most of them do not get good family support and environment for pursuing mathematics in higher education. They are compelled to shift from mathematics and science to other easier subjects. Therefore, the number of women completing master and ph. D in mathematics and mathematics education is very low as compared to the male counterparts.

The overall female literacy rate of Nepal is law in comparison to the male literacy rate. The male literacy rate of Nepal is low in comparison to the male literacy rate. The male literacy rate is 75.1% compared to female literacy rate of 57.4% (CBS’ 2011). The female literacy rate has increased from 42.8% (CBS, 2001) to 57.4% (CBS. 2011). The female literacy rate has increased from 42.8% (CBS, 2001) to 57.4% (CBS, 2011). Thought there is a slight increment in literacy rate of females through the period of 10 years. I have found very less percentage of females who have enrolled in different educational programs. Out of 1,652,624 students involved in serval fields of study after completion of SLC, only 622,012 are females. i.e. only 37.64% (CBS, 2011). In the field of mathematics and statistics, there was on enrollment of only 2,820 females out of 17,260 students i.e. 16.34% in Tribhuvan University. It clearly shows that the

participation of females in mathematics is low. From these reports, I discovered that are fewer enrollments of the females in University education, particularly in the technical field.

When I started my profession life as a teacher from Shree Pawar secondary school, Arghakhanchi, Nepal. I found very less pass girls in the mathematics. And very less girls than boys in mathematics (OPT) in the classroom at secondary level (class 9 and class 10). In the school where there were no female mathematics teachers teaching mathematics. So I realized then it is a big issue in our teaching and learning context. I used to wonder why the number of girl students taking mathematics was less than that of boys or even nil. Why some of them left mathematics education without completing the course? Why do girl students take mathematics as a complicated one? Why is mathematics said to be irrelevant for girls? How could we empower girl students to learn mathematics? Therefore, I became interested to explore the issue behind those problems.

Various social, Cultural and organizational barriers hider women to be mathematics students and teacher at the secondary level (class 9 and class 10). There are a great variation and inequality between men and women to participate in mathematics, including other disciplines. In my experience, the involvement of females in mathematics teaching and learning at school, college and university levels have not been changed significantly in the last decide in Nepal. However, I have seen some improvements in teaching. But it's not improving significantly as is expected to be. " just as gender equality in education and women in the teaching have strong linkages, so the issues of women, teaching, learning, and the feminization debate also have a place within the broader context of gender equality in society as a whole" (Kelleher, 2011, p. 5).

Actual scenarios for the females participating in mathematics are the main issue to be analyzed. In this paper, I am going to find out the gender – related issues, especially focused on women in mathematics.

Statement of the problem

In my journey of learning mathematics from school to university, there were a minimal number of girl students in the classroom. There is still a misconception that mathematics is a difficult subject among students and parents. Such misconception has severely affected women enrolment and participation in mathematics education in Nepal. Mathematics is normally favored and controlled by men. It is taken as a complicated subject for women. I have experienced and seen in the capacity of female mathematics educator that learning mathematics is more challenging for girls not because it is difficult by nature but by the social stigma of mathematics in general. As a result, there was a very smaller number of female students compared to males.

Objective of the student

1. To explore the gender issues in mathematics education
2. To find the behavior of mathematics teacher with their students

Research questions

1. What the problems of gender issues in mathematics?
2. How to mathematics teachers deal with student?

Delimitation of the study

The study has following delimitation

- To effect the COVID 19 (lockdown)

- This study was conducted in Shree Pawar Secondary School which is a gender issues based public school of Arghakhanchi District situated in Sitganga Municipality.
- This study was delimited on grade 9 and grade 10 of selected class.
- Two female students and two male students, two mathematics teacher one male and one female teacher were selected for in-depth interview.
- This study was delimited to one school.
- The study is delimited only one qualitative design.

CHAPTER II

REVIEW OF RELATED LITERATURE

Literature review is very important of aspect of academic research and essential element of research design. The review of the related literature is also an essential part of research for the research because literature helps and guides research to meet theoretical way for the study. Literature provides strong knowledge and it facilitates to select appropriate research problem. The main purpose of review of related literature is to find out what have been done Literature Review is a very important aspect of academic research and in the field of the research. It helps to conduct the new research in a systematic manner by providing the general outline of the research study and avoids unintentional replication. Review of related literature is carried out in three heading which are empirical review, theoretical review and conceptual review which are explained below in separate headings review.

Empirical Literature Review

Various demographic factors are known to be related to mathematics achievement. Gender, socio – economics status, and parent's educational level are factors that were analyzed in this study as predictors of mathematics achievement. Many variables have long been studied as predictors of mathematics achievement however gender issues on mathematics achievement are studied most frequently by researchers for instance, a study though a meta-analyzed reveals that males tend to do better on mathematics tests that involve problem – solving (Hude, Fennemaj & Lamon 1990). Females tend to do better in computation and there is no significant gender difference in understanding mathematics concepts. Another study shows that females tend to earn better grades than males in mathematics (Kimball, 1989). Some recent

studies have revealed that gender difference in mathematics education seem to be narrowing in many countries. However studies indicate that as students reach higher grades, gender differences favor increase in mathematics achievement by males (Campbell, 1995: Gray, 1996: Mullis, Martin, Fierro's, Goldberg & Stemler, 2000). For instance the results from the third international mathematic and science study showed that mathematics achievement scores of each gender group were close to each other at the primary and middle school years (Beaton ET. Al., 1996: Mullis et al., 1997).

However, in the final year of secondary school, evidence was found for gender difference in mathematics achievement. Another study, which was conducted to analyzed factors that effect mathematics achievement of 11^{th}- graders in mathematics classes with an identified gender gap, also showed that males score higher than females on 11^{th} grade mathematics achievements but this difference decreased from 10^{th} grade (Campbell and Beaudry, 1998).

Women and men are biologically different but their roles, status, positions, responsibility are somewhat the same. In our male dominate society, there is a different way to see the female from the point of view on mathematics education. There is a belief that a female is not above to grasp technical subjects such as mathematics, science and therefore is unable to teach and learn. While interacting with male and female teachers and male and female students in the secondary level and summing up their view, I found this subject to be male dominant in the society. We should focus on the issues that I have raised in this paper.

APEC Human Resource Development Working Group, September 10) : The research suggest that gender difference in mathematics and science education achievement and career choice do not seen to be driven by biological differences. Instead, girls and boys

make choices throughout their education and professional careers, and there systematic differences in these choice. To the extent that these choice. To the extent that these choices are limited by lack of encouragement misinformation, or stereotypes, it is possible to address the barriers and provide both girls and boys with the information and encouragement to broader their options.

This can be accomplished through setting out the organizational mechanisms that will help bring about gender equality in education and career opportunities (Tembon and fort, 2008; UNESCO, 2010; UNICEF; 2010). In part 2, we discuss strategies for overcoming these limitations and developing interest and investment in math and science- we first look at how an economy can raise awareness at the national level, then at more focused strategies for piquing student's initial interest and building long-term interest and investment.

Newai, 2071: the study can be concluded that there was no significant difference between every aspects of mathematical thinking and mathematics achievement between male and female students of grade x. there was no significant difference between mathematical thinking (total) and mathematical achievement (total) among the male and female students in every aspects of mathematics thinking. There was significant difference in the four aspects of mathematical thinking, generalization and mathematical proof. But there was no significant difference in the problem solving among the students from secondary level.

Chebet Catherine Mutai, 2016: The present research finding have provided suffice that girls had formed negative attitude towards the subject and they did not have any interest for it. Boys has a positive attitude towards learning of mathematics while there are difference among individuals in learning mathematics, little is based on gender

as most differences cut across all gender. It is therefore, possible to lift the performance of girls and reduce the gap by moderating the few areas responsible.

The school administration has not prioritized learning of mathematics by purchasing the relevant resources to equip teaching of mathematics. Mathematics is not so demanding in resources like mathematics models and mathematics instruments, majority of the secondary school boys and girls in Bureti sub-country indicated that

- Mathematics helps them make decision in their future career.
- Careers they are likely to pursue require mathematics. This is indicative that they realize the role of mathematics.

It was concluded that there exist gender differences in statistics and probability in mathematics in Bureti sub-country, Kenyu girls were see to be performing lower than boys in statistics and probability in mathematics in secondary schools.

Parents influence was important in influencing the participation of girls in mathematics. However, they do not play their roles effectively since they are not conversant with school programs. Finally the larger society still perceives mathematics to be a male domain and hence does not strongly encourage girl's participation in mathematics.

Affective or attitudinal variables were also examined in the Fennema-Sherman studies. Identified as critical were belief about the usefulness of mathematics and confidence in learning mathematics, with males providing evidence that they were females and males believing that mathematics was, and would be more useful to them then did females. It is also became clear that while young men did not strongly stereotype mathematics as a male domain, they did believe much more strongly that did young woman that mathematics was more appropriate for males than for females. The importance of these variables, their long – term influence and there difference impact

on female and male was reconfirmed in many of our later studied as well as by the work of many other (Leder; 1992).

Shrestha (1991) has conducted a study on the topic “A study of sec difference in mathematics of ninth grade students in Gorkha District” with the objective to determine the sec influence achievement in mathematics. He prepared two set up tools, which are achievement test and questionnaire and administered them to two hundreds eighty students of five schools. He applied t-test conclude that boys devoted more time than girls at home study for mathematics together with all subject and boys performed better than girls in mathematics achievement.

Spence & et al. (1998) had also done a research on mathematics performance entitled “Stereotype threat and women’s mathematics performance.” They had conducted their research in two phases. The first phase was conducted on 31 men and women whereas the second phase was conducted on 28 men and women from the introductory psychology pool at the University of Michigan. Using ANOVA, they had found that women’s mathematics performance improved when the stereotypical threat decreased.

Bassey & et al. (2001) form Cross River University of Technology, Calabar and University of Calabar have also done a research titled Gender differences and Mathematics Achievement of Rural Senior Secondary Students in Cross River State, Nigeria. In this research they study the significance of gender difference, parental, social-economic status and school proprietorship mathematics achievement of rural male and females students and found that there is significant difference between the mathematics achievement of the rural male and female students. They also found that the achievement of rural male and female students differ only for those in the low socio-

economic bracket and for public school. At other levels of variables, there is no statically significance difference.

Dhakal (2006) conducted a study on the topic "A study of the factor affecting the girls students attitude towards the selection of optional mathematics at secondary level". She concluded from the girls should have the positive attitude towards the selection of optional mathematics, the attitude is only the determining factors to select the optional mathematics and the girls students do study optional mathematics because they have positive attitude do not select optional mathematics.

Kenney-Benson and et al. (2006) did a study entitled, "Sex Difference in Math Performance: the role of Children's Approach to Schoolwork." This research examined whether the tendency for girls to outperform boys in the classroom is due to differences in how girls and boys approach schoolwork. In 5^{th} grade and then again in 7^{th} grade, children (N=581) reported on how they approach schoolwork (i.e, achievement goals and classroom behavior), their learning strategies, and their self-efficacy in math: math grades and achievement test scores wire also collected. Girls were more likely than boys to hold mastery over performance goals and refrain from disruptive classroom behavior, which predicated girl's greater full earning overtime. The sex difference in learning strategies accounted for girl's edge over boys in terms of grades. Girls did not do better on achievement tests, possibly because self-efficacy, for which there was also no sex difference, was the central predictor of performance on achievement tests.

Poudel (2006) conducted a research on "A comparative study on mathematics achievement of secondary level students taught by trained and untrained teachers". The purpose of this study is to compare the mathematical achievement of students taught by trained and untrained teachers. To collect the data, first a set of achievement test

question was developed and administrated on 168 (84 boys and 84 girls) students of grade 9 form 12 schools of Kathmandu district. Secondly two set of Opinionative were developed. The means, standard deviations, percentile, cumulative frequency curve and t-test were used as a statistical tools to analyze and interpreter the data. In the comparison of boy's achievement in mathematics, it was found that there was significance difference in their achievement taught by trained and untrained teachers. Similarly, the mathematics achievement of girls at the same grade taught by trained teacher was not equal to that of untrained teachers and concluded that, there was significance difference in mathematics achievement of girls taught by trained and untrained teachers. Whether, both boys and girls were taught ty trained teachers, there was significance difference in mathematics achievement of gender wise, it was concluded that there was significance difference of boys and girls achievement taught by trained teachers. But in the case student taught by untrained teachers, it was found that achievement of boys and girls has no difference. Thus, it was concluded that there was insignificance difference in the achievement of boys and girls who were taught but untrained teachers.

Khanal (2007) conducted research on "A study of the effect of gender in Learning Mathematics." The purpose of study is to explain the effect of social process of gender formation in the community and to identify the influence of gender control and gender belief in mathematics learning. His study was an interpretative the types and case study approaches was followed. Six female and six male students were selected for his qualitative study. He had used observation and interview tools in his study. From his study he found that different values of society for boys and girls determine their major works in the family as well as society and hence it makes the gender formation in the community. Parent's role was importance in gender formation

in community. He further found that girls get so much involved in culture practices, girls own internalization that education to them was less important that to sons, their less availability of time for study as a result their secondary position in learning and achievement. The result also revealed that gender bias was existing in school.

Adhikari (2009) conducted a research on "factors influencing achievement of Newar students in Mathematics." (A study in Lalitpur District). The purpose of this study is to find out the level of achievement of Newar students in mathematics and the influencing factors that determines achievement of Newar students in Mathematics. Gender discrimination by family members shows significant effects on their learning process. Study environment at home and school, guided by teachers and elder brother and sisters, Newari culture, feast and festivals, mother tongue, occupation of parents, use of play cards and wines by family members, regularly in the math class, teacher biasness, trained teachers, teaching materials etc. were found influencing factors in mathematics achievement of Newar students.

Das & Wilkinson (2011) studied on the effects of gender, class level and ethnicity on attitude and learning environment in college algebra course. The goal of this study was on investigate factors (gender, class and ethnicity) that might affect the attitude and learning environment perception of college students in a college algebra course. A sample was been chosen from a regional university and quantitative research method has been used to analyze 17 Likert scale questions in four categories, value of the subject (6 statements), interest in the subject (4 Statements), classroom environment (2 statements), and difficulty of the subject (5 statements). Results show that male students, white students and freshman students consistently reported more positive perceptions in these four categories than did their counterparts. The quantitative data were statistically analyzed using factorial ANOVA. Results show that white students'

final grades were consistently a little higher than non-white students and female students' scores were higher than those of male students. The same statement is also true for freshman students.

Throughout the 1905 assimilationist and deficit model approaches continued to would and underpin many of the intervention initiatives aimed at achieving gender equality in mathematics learning outcomes. Data on male's and female's participation and performance in mathematics subject and tests continued to be reported in scholarly publications. Attempts to identify underlying sources and cases often accompanied such reports. Personal and environmental factors as well as well as previously unchallenged government policies began to be examined. Researchers concerned with gender differences and mathematics learning were acknowledged as significant contributors to the border field of research on affect and mathematics learning. As argued by Mcleod (1992), the "important area of research on befits comes mainly out of the work on gender differences in mathematics education" (p. 580).

Gender Differences in Mathematics Education

The developed world's perspective on gender and mathematics

Contemporary research studies reflect scholars' maturing view of the complexity of causation of differences between males and females in mathematics education. As fennema (2000) rightly points out, from around 1970, *'sex differences'* index was used to imply that any differences found were biologically, and thus, genetically determined, immutable and not changeable. During the 70's and 80's *'sex related differences'* criterion was often used to indicate that the while the behavior of concern was clearly related to the sec of the subjects, it was not necessarily genetically determined. Letey, *'gender differences'* refers to social or environmental causation of

differences that are observed between the sexes. According to Leder (1996) there were probably more research studies published on gender and mathematics than any other area between 1970 and 1990. Fennema (1993, 2000) concluded that while many studies had been poorly analyzed and included sexist interpretations, there was evidence to support the existence of differences between girls' and boys' learning of mathematics, particularly in activities that required complex reasoning that the differences increased at about the onset of adolescence and were recognized by many leading mathematics educators. Salmon (1998) concurred with the notion that gender differences increase at secondary school level, particularly in situations that require complex reasoning. In the absence of an African position disputing such views. It suffices to assume that similar differences might occur in the Southern African contexts.

Studies by Fennema and Sherman (1977, 1978) documented sex-related differences in achievement and participation, and found gender differences in the election of advanced level mathematics courses. They hypothesised that if females participated in advanced mathematics classes at the same rate that males did, gender of their studies as a fefutation of this *'differential course-taking hypothesis'.* They argued that gender differences in mathematics were genetic, a claim which was widely attacked and disproved, but whose publication had unfortunate repercussions (Jacobs and Eccles, 1985).

Fennema and Sherman (1977, 1978) identified as critical, beliefs about the usefulness of, and confidence in learning mathematics, with males providing evidence that they were more confident about learning mathematics and believed that mathematics was, and would be, more useful to them than did females. There was evidence that while young men did not strongly stereotype mathematics as male domain, they did believe much strongly than did young women that mathematics was

more appropriate for males than for females. The importance of these variables (confidence, usefulness and male stereotyping), their long-term influence, and their differential impact on females and males was re-confirmed by many other studies (Hyde et al., 1990; Tartre and Fennema, 1991; Lwdwr, 1992).

Earlier, Maccoby and Jacklin (1974) had reported differences between females and males in spatial skills, particularly spatial visualization or the ability to visualize monements of geometric figures in one's mind. The Fennema-Sherman studies and the Fennema and Tartre (1985) longitudinal study investigated was positively correlated with mathematics achievement (that does not indicate causation), not all girls were handicapped by inadequate spatial skills, except those who scored very low on spatial task. Fennema (1993) suggested that an appropriate curriculum redesign could compensate for these weak skills. Other studies (Kerns and Berenbaum, 1991; Voyer, Voyer and Bryden, 1995) reported boys outperforming girls on tests of visual/spatial abilities; the ability, that is, to draw inferences about or to otherwise mentally manipulate pictorial information. The male advantage in spatial abilities was reportedly not large, but detectable by middle childhood and persisted across the life span. Casey, Nuttall and Pezaris (1997) concluded that sex differences in visual\spatial abilities and the problem-solving strategies they support contribute to sex differences in arithmetic reasoning.

Although they were not particularly innovative nor offered insight that others were not suggestion, the Fennema-Sherman studies had a major impact since they were published when the concern with gender and mathematics was growing internationally. They were the concern with gender and mathematics was growing internationally. They were identified by Walberg & Haertel (1992) and other5 as among the most often quoted social science and educational research studies during the 80's and 90's the

problems of gender and mathematics were defined and documented in terms of the study of advanced mathematics courses, the learning of mathematics, and selected related variables that appeared relevant both to students selection of coursed and learning of mathematics. The Fennema-Sherman Mathematics Attitude Scales have been widely used as guidelines for planning interventions and research studies.

Campbell (1986) found that girls lack of confidence in themselves as mathematics learners, their perception of mathematics as difficult and their view that mathematics is a male activity, all had impact on girls' attitudes, achievement, and participation in advanced courses. In a longitudinal study of sixth, eighth, tenth, and twelfth grades, Tartre and Fennema (1991) found that, for girls, viewing mathematics as a male domain was correlated mathematics achievement. Girls in single-sex schools or in out-of-school mathematics projects-who did not see mathematics as an exclusively male domain tended to have higher mathematics success. When this dynamic was changed to make mathematics accessible to both girls and boys, girls' interest and involvement were found to rise.

Reyes and Stanic (1998) and Secada (1992) have argued that socioeconomic status and ethnicity interact with gender to influence mathematics learning. Forgasz and Leder (1998) share the view that gender differentials in participation rates are associated with the interaction of positive attitudes and beliefs about mathematics and socioeconomic status. The transferability of these findings, based on Western cultural concepts, poses a problem for African contexts. Socioeconomic status indicators in Botswana for instance, somewhat differ from UK model and need be appropriately contextualized. The question of ethnicity also becomes problematic in the Botswana context since about 85% of the population is of Tswana ethnic origin. Moreover, ethnic

differences have never been of significance and might not necessarily affect gender differences in mathematics in the same way as in Western contexts.

The above collections of literature were closely related to this study. The review of above-mentioned literatures has provided important implications on the issues of girls. However, most of the researches and studies were based on the achievement differences between girls and boys as well as difficulties and barriers for girls' learning in mathematics learning. Thus, this study will fill the knowledge gap that all kind of factors impact on girls and boys in mathematics learning among Newari society.

Theoretical Literature Review

A theoretical discussion is needed for the interaction of the findings of the study. It serves as a basis for developing a theoretical framework that helps to investigate the problem that the researcher wishes to do. I went through different theoretical concepts to support this study which helped me to develop insights regarding the topic. In the theoretical review, I describe the theory of fairness and feminist theory which is related to my study.

Feminist Theory

Feminist theory is related to women in different areas like sociological theory and learning sectors. Feminism is the belief that women should have equal rights to men. In consequence, the feminist movement fights for equal rights and opportunities for women. There are many different kinds of feminism and feminists themselves tend to disagree about the ways in which exactly should be done to get equal rights. It argues that females are excluded from the domain of mathematics that's why women remain privileged. Feminist theory is supports of equality for women and men, expanding human choice, eliminating gender stratification, ending sexual violence and promoting

sexual freedom. Feminist theory focuses power in its relation to gender. Feminist argue that only including or adding women in the domain of mathematics does not serve the propose of understanding woman are justify the absence of females presence in mathematics. Even teacher should not motivate their girls' students to study of mathematics but in our society girls students are losing the confidence due to the lack of encouragement from their responsible teacher. Not only the teacher is blamed for this problem but also the parents of the girls' students are responsible. In our patriarchal society, not believe in getting equal opportunity as male-females do everything. They further claims that the biological difference between men and women does not explain their roles inside classroom rather it needs to be understood as socially constructed (Askins, 2005). They admit that there are anatomical differences between boys and girls but what is important are the ways in which girls and boys are socialized and brought up, how they are treated and interacted and the ways they are taught the appropriate behavior.

Feminist pedagogy is an approach to education that brings to bear feminist theory, feminist activism, and women's experiences on educational content, the learning environment, the relationship between teacher and student, and the connection between the learning environment and the outside world. The approach emerged as a clear educational strategy by the 1980s and was influenced by feminist activism, critical pedagogical theory, and the progressive educational movement in the United States. Like critical pedagogy, feminist pedagogy rejects traditional pedagogical approaches that perpetuate hegemonic power structures. Feminist pedagogies are particularly critical of educational approaches that maintain gender oppression and other intersecting forms of oppression. Feminist pedagogy envisions learners as active agents

who work in the Feminist community with teachers in an environment that values personal experience to critique.

Feminist theories first emerged as early as 1794 in publications such as *A Vindication of the Rights of Woman* by Mary Wollstonecraft, "The Changing Woman",[10] "Ain't I a Woman",[11] "Speech after Arrest for Illegal Voting",[12] and so on. "The Changing Woman" is a Navajo Myth that gave credit to a woman who, in the end, populated the world.[13] In 1851, Sojourner Truth addressed women's rights issues through her publication, "Ain't I a Woman". Sojourner Truth addressed the issue of women having limited rights due to men's flawed perception of women. Truth argued that if a woman of color can perform tasks that were supposedly limited to men, then any woman of any color could perform those same tasks. After her arrest for illegally voting, Susan B. Anthony gave a speech within court in which she addressed the issues of language within the constitution documented in her publication, "Speech after Arrest for Illegal voting" in 1872. Anthony questioned the authoritative principles of the constitution and its male-gendered language. She raised the question of why women are accountable to be punished under law but they cannot use the law for their own protection (women could not vote, own property, nor themselves in marriage). She also critiqued the constitution for its male-gendered language and questioned why women should have to abide by laws that do not specify women.

Nancy Cott makes a distinction between *modern feminism* and its antecedents, particularly the struggle for suffrage. In the United States she places the turning point in the decades before and after women obtained the vote in 1920 (1910–1930). She argues that the prior *woman movement* was primarily about woman as a *universal* entity, whereas over this 20-year period it transformed itself into one primarily concerned with social differentiation, attentive to *individuality* and diversity.

New issues dealt more with woman's condition as a social construct, gender identity, and relationships within and between genders. Politically this represented a shift from an ideological alignment comfortable with the right, to one more radically associated with the left.[14]

Susan Kingsley Kent says that Freudian patriarchy was responsible for the diminished profile of feminism in the inter-war years,[15] others such as Juliet Mitchell consider this to be overly simplistic since Freudian theory is not wholly incompatible with feminism.[16] Some feminist scholarship shifted away from the need to establish the origins of family, and towards analyzing the process of patriarchy.[17] In the immediate postwar period, Simone de Beauvoir stood in opposition to an image of "the woman in the home". De Beauvoir provided an existentialist dimension to feminism with the publication of *Le Deuxième Sexe* (*The Second Sex*) in 1949.[18] As the title implies, the starting point is the implicit inferiority of women, and the first question de Beauvoir asks is "what is a woman"?[19] A woman she realizes is always perceived of as the "other", "she is defined and differentiated with reference to man and not he with reference to her". In this book and her essay, "Woman: Myth & Reality", de Beauvoir anticipates Betty Friedan in seeking to demythologize the male concept of woman. "A myth invented by men to confine women to their oppressed state. For women, it is not a question of asserting themselves as women, but of becoming full-scale human beings." "One is not born, but rather becomes, a woman", or as Toril Moi puts it "a woman defines herself through the way she lives her embodied situation in the world, or in other words, through the way in which she makes something of what the world makes of her". Therefore, the woman must regain subject, to escape her defined role as "other", as a Cartesian point of departure.[20] In her examination of myth, she appears as one who does not accept any special privileges for women. Ironically,

feminist philosophers have had to extract de Beauvoir herself from out of the shadow of Jean-Paul Sartre to fully appreciate her.[21] While more philosopher and novelist than activist, she did sign one of the *Mouvement de Libération des Femmes* manifestos.

The resurgence of feminist activism in the late 1960s was accompanied by an emerging literature of concerns for the earth and spirituality, and environmentalism. This, in turn, created an atmosphere conducive to reigniting the study of and debate on matricentricity, as a rejection of determinism, such as Adrienne Rich[22] and Marilyn French[23] while for socialist feminists like Evelyn Reed,[24] patriarchy held the properties of capitalism. Feminist psychologists, such as Jean Baker Miller, sought to bring a feminist analysis to previous psychological theories, proving that "there was nothing wrong with women, but rather with the way modern culture viewed them".[25]

Elaine Showalter describes the development of feminist theory as having a number of phases. The first she calls "feminist critique" – where the feminist reader examines the ideologies behind literary phenomena. The second Showalter calls "Gynocritics" – where the "woman is producer of textual meaning" including "the psychodynamics of female creativity; linguistics and the problem of a female language; the trajectory of the individual or collective female literary career and literary history". The last phase she calls "gender theory" – where the "ideological inscription and the literary effects of the sex/gender system" are explored".[26] This model has been criticized by Toril Moi who sees it as an essentialist and deterministic model for female subjectivity. She also criticized it for not taking account of the situation for women outside the west.[27] From the 1970s onwards, psychoanalytical ideas that have been arising in the field of French feminism have gained a decisive influence on feminist theory. Feminist psychoanalysis deconstructed the phallic hypotheses regarding the Unconscious. Julia Kristeva, Bracha Ettinger and Luce Irigaray developed specific

notions concerning unconscious sexual difference, the feminine, and motherhood, with wide implications for film and literature analysis.[28]

Fairness Theory

John Rawls was born in Baltimore, Maryland, in 1921. His father, a corporate lawyer, supported President Franklin Roosevelt and the New Deal. His mother was a women's rights activist. The second of five sons, Rawls tragically contracted and passed on infectious diseases to two of his brothers who died from them. Rawls attended mainly private schools before entering Princeton in 1939. He was unsure about a career but ended up majoring in philosophy. This stimulated an interest in religion, and he considered training for the ministry. After graduating with a degree in philosophy in 1943, he enlisted in the Army and served in the South Pacific for two years in an infantry intelligence unit. After his discharge from the Army following the war, he returned to Princeton and pursued an advanced degree in philosophy under the GI Bill of Rights. He earned his PhD in 1948. In 1950, Princeton hired Rawls as an instructor in the philosophy department. But he also continued his own studies, especially in economics. In 1952, Rawls won a Fulbright fellowship to Oxford where he first developed the idea for what later became his famous "thought experiment." After returning to the United States, he joined the philosophy faculty at Cornell, then at the Massachusetts Institute of Technology, and finally at Harvard. He remained a professor of philosophy at Harvard from 1962 until he retired in 1991. Rawls was mainly an academic man, involved in abstract thinking and writing. During the Vietnam War, however, he led an effort at Harvard that questioned the fairness of student military draft deferments. Why, he asked, should college students, many with social and economic advantages, avoid the draft while others without these advantages had to go to war? He preferred a lottery system, which the United States eventually adopted late

in the Vietnam War. During the 1960s, he mainly concentrated on writing *A Theory of Justice*, published in 1971. This complex work attempted to develop standards or principles of social justice that could apply to real societies.

Justice as Fairness

Rawls called his concept of social justice "Justice as Fairness." It consists of two principles. Since he first published *A Theory of Justice*, he changed the wording of these principles several times. He published his last version in 2001.

The First Principle of social justice concerns political institutions:

Each person has the same and indefeasible [permanent] claim to a fully adequate scheme of equal basic liberties, which scheme is compatible with the same scheme of liberties for all.

This principle means that everyone has the same basic liberties, which can never be taken away. Rawls included most of the liberties in the U.S. Bill of Rights, such as freedom of speech and due process of law. He added some liberties from the broader area of human rights, like freedom of travel. Rawls recognized the right of private individuals, corporations, or workers to own private property. But he omitted the right to own the "means of production" (e.g., mines, factories, farms). He also left out the right to inherit wealth. These things were not *basic* liberties in his view. Rawls agreed that basic liberties could be limited, but "only for the sake of liberty." Thus, curbing the liberties of an intolerant group that intended to harm the liberties of others may be justified.

The Second Principle of social justice concerns social and economic institutions:

Social and economic inequalities are to satisfy two conditions:

First, they are to be attached to offices and positions open to all under conditions of fair equality of opportunity; and

Second, they are to be to the greatest benefit of the least-advantaged members of society (the Difference Principle).

This Second Principle focused on equality. Rawls realized that a society could not avoid inequalities among its people. Inequalities result from such things as one's inherited characteristics, social class, personal motivation, and even luck. Even so, Rawls insisted that a just society should find ways to reduce inequalities in areas where it can act. By "offices and positions" in his Second Principle, Rawls meant especially the best jobs in private business and public employment. He said that these jobs should be "open" to everyone by the society providing "fair equality of opportunity." One way for a society to do this would be to eliminate discrimination. Another way would be to provide everyone easy access to education. The most controversial element of his theory of social justice was his Difference Principle. He first defined it in a 1968 essay. "All differences in wealth and income, all social and economic inequalities," he wrote, "should work for the good of the least favored." Later, when he wrote *A Theory of Justice,* he used the phrase, "least-advantaged members of society" to refer to those at the bottom of economic ladder. These might be unskilled individuals, earning the lowest wages in the society. Under the Difference Principle, Rawls favored maximizing the improvement of the "least-advantaged" group in society. He would do this not only by providing "fair equality of opportunity," but also by such possible ways as a guaranteed minimum income or minimum wage (his preference). Rawls agreed that this Difference Principle gave his theory of social justice a liberal character.

Finally, Rawls ranked his principles of social justice in the order of their priority. The First Principle ("basic liberties") holds priority over the Second Principle. The first part of the Second Principle ("fair equality of opportunity") holds priority over the second part (Difference Principle). But he believed that both the First and Second Principles together are necessary for a just society. People in this hypothetical Justice as Fairness: Introduction in a Theory of Justice, John Rawls argues that justice is to be understood in terms of fairness. According to Rawls, a just society will be a society that is based upon principles. The principles are the best formulation of a social system that is not based upon personal interests or specific moral doctrines. Rawls gives two principles of justice which he argues are sufficient to make any society a just society. These two principles are to serve as the framework for the construction and reformation of institutions. Rawls argues that the two principles of justice are sufficient for a just society. Included in Rawls' overall theory is a notion of institutional desert. An institutional theory of desert says that people are entitled to goods in accordance with the rules of institutions. An institutional theory of desert, such as Rawls', is designed to show how just social institutions distribute goods without taking into consideration the overall moral character of individuals. For Rawls, the principles of justice as fairness and the organization of an institutional theory of desert make a society just. However, this formulation of a theory of justice is not completely sufficient. Rawls claims that the two principles of justice as fairness will be chosen by people in a social contract setting where all people do not know the specifics of their own or other's situations will choose principles which are based upon a strong notion of equality. But since the people in the hypothetical situation are not real people with specific needs, it is problematic to say that these principles apply to real life societies and institutions. 1 People in actual situations are more likely to include personal interests in their decision making

processes. It is questionable if the principles of justice as fairness can be used to address the more complex problems of actual societies. This paper will do three main things. The first is to discuss Rawls' hypothetical theory of justice as fairness. The hypothetical theory, which Rawls' calls "formal justice," is based upon his discussion of the "original position" which serves as a foundation for the theory as a whole. The essential components of the theory of formal justice will be used to show how Rawls' hypothetical theory of justice as fairness is based upon a strong notion of equality. The second part of this paper will discuss Rawls' theory of institutions. Rawls' theory of institutions shows how the principles of justice from the hypothetical structure are supposed to work in real life situations. Thus, the structure of both hypothetical institutions and more concrete institutions will be examined. By examining Rawls' theory of institutions, it will be shown that Rawls has another conception of justice as fairness. In the hypothetical situation, justice as fairness is best understood in terms of equality. Rawls is 8aware that in real life situations, people are not equal. Rawls' theory of institutions will show how Rawls addresses the issues of social inequalities. Rawls' discussion of institutions will show that he is committed to a different conception of justice as fairness. The purpose of this paper is to argue that Rawls' theory of justice as fairness is actually two theories. In order to strengthen this claim, the issue of moral desert will be used to show how Rawls' two theories operate on different notions of desert. In the 2 hypothetical situation, desert is an easily ignorable problem; all people in the original position are devoid of any specific characteristics. People who do not know anything about themselves will be unable to make claims about what it is that they deserve. Rawls' theory of institutions attempts to replace the issue of moral desert with socially legitimate expectations. These expectations are both provided by and dictated by the rules of institutions. What is fair in a hypothetical situation is not

necessarily what is fair in an actual social institution. By examining Rawls' theory of justice as fairness in regard to the issue of desert, it will be possible to show that Rawls is giving us two theories of justice as fairness. It should be noted that these two theories are not contrary nor contradictory.

The two theories address two different scenarios and offer different conceptions about what constitutes fairness. 3 Justice as Fairness: Formal Justice in a Theory of Justice, John Rawls gives a theory of justice where justice is to be considered in terms of fairness. The first part of the work is based upon Rawls' notions of formal justice. Formal justice is the purely hypothetical formulation of principles of justice which is meant to serve as a foundation for Rawls' latter claims. According to Rawls, formal justice can be found in a hypothetical social contract which Rawls calls "the original position." Rawls structures the original position in order to show how justice will be understood in terms of fairness. In formal justice, all hypothetical individuals will be more or less equal due to the restrictions Rawls places upon people in the original position. Rawls' theory of justice as fairness is based upon a social contract theory. According to Rawls, a social contract is useful for discussing justice because a social contract lends itself to the formulation of principles of justice. Within any society, there will be different competing definitions of justice. Rawls' solution to this problem is to define social justice in terms of general principles. Principles of justice will be much broader in scope than specific definitions of justice. Principles will be much more readily agreed upon by people then specific definitions of justice. Rawls says, "These principles are to regulate all further agreement; they specify the kinds of social cooperation that can be entered into and the forms of government that can be established."1 Justice constituted by principles will serve two functions.

Conceptual Frame word of the Study

Conceptual framework is a representation, either graphically or in narrative form, of the main concepts or variables, and their presumed relationship with each other. It maps out the actions required in the course of the study given by his previous knowledge of another researcher point of view and his observation on the subject of research. It is the researcher's ''map'' in pursuing the investigation. I have developed a conceptual framework for this study shown in figure below.

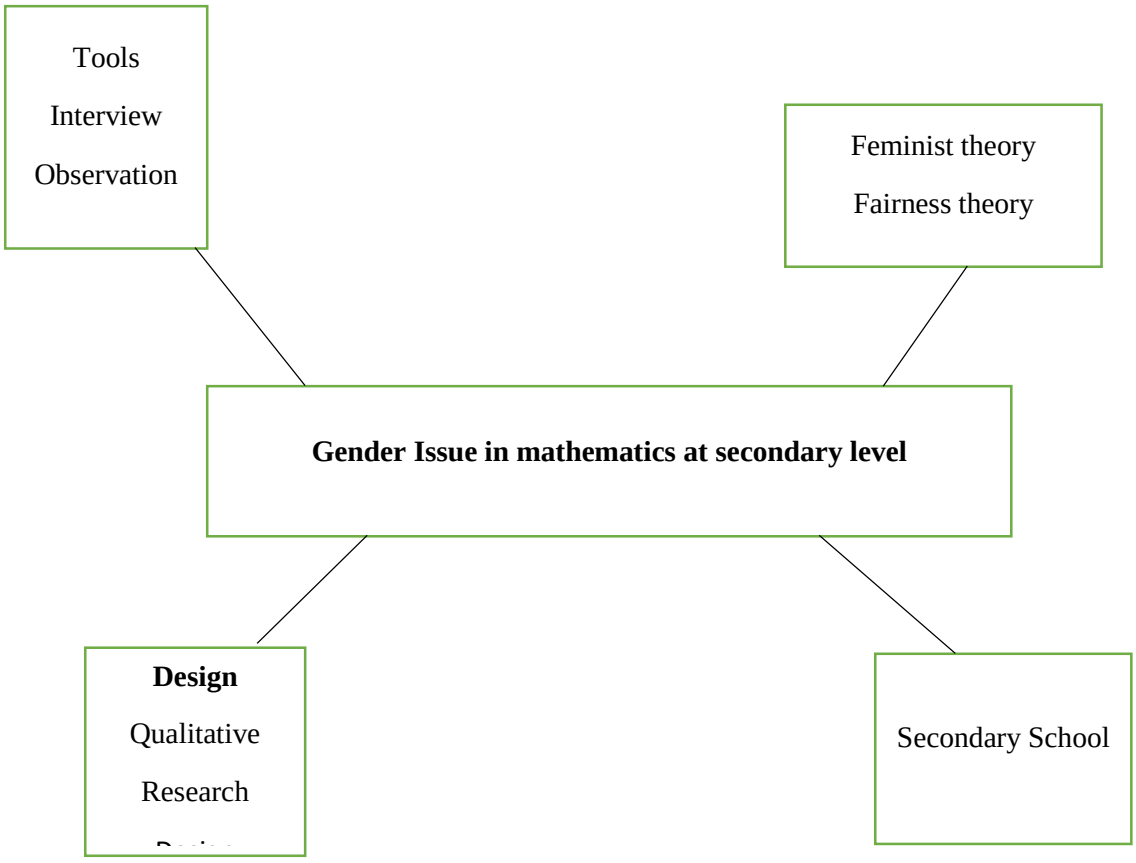

Figure 1: Conceptual Framework

Chapter III

Method and Procedures

This chapter begins with its design of the study, population of the study, sample and sampling strategy, study area/field, data collection tools and techniques, data collection procedure and data analysis procedure. The chapter explained the plan and method of study which helped to achieve the objectives of the study. Qualitative research takes an interpretative, naturalist approach to its subject matter, qualitative researchers study things in their natural setting, attempting to make, phenomena, in terms of meaning that people bring to them, so I will choose this qualitative research method for my study.

Design of the Study

In learning mathematics, which is directly or indirectly related to the school and out of school factors. The study was designed to determine the factors affecting the learning of mathematics in public schools. Therefore, I used a case study approach under qualitative design as well as an in-case study. So for achieving this purpose, I used the case study research approach because in the case of study design data is collected through direct observation in natural settings and the actual incident on the spot.

Study Area/Field

Every study needs study area, searcher has chosen one public secondary school of Arghakhanchi district. I selected Shree Pawar Secondary School sitganga municipality – 14, Arghakhanchi for the area of my research. The area of this study based on secondary level students under the one public school of Arghakhanchi district.

And also for the study area I selected only secondary level students under studying mathematics.

Selection of Respondents

For participants, I selected Shree Pawar Secondary School from Arghakhanchi district using purposive sampling technique (based on my convenience). From there I took one public school by convenience sampling. And also I took four mathematics students, two mathematics teachers one male and one female. Base on the school previous result, I selected talented, and medium abilities students whose previous mathematics result achievement level is medium.

Data Collection Tools

The study intended to find what are the gender issues in mathematics at secondary level learning in governmental school in grade nine and grade ten students. For this I used the following instrument to gather the data.

Interview schedule: in-depth interview is used basically in qualitative study design. With the same respondents several interviews are taken in different times. The term in-depth it suggest that one after another interview, new themes, perspectives or issues are explored and these newly generated themes/issues are followed in the next interview. So in-depth interview attempts to draw very inner meaning of phenomena from the perspective of the respondents. It is taken periodically in different settings, and different circumstance of the respondents but the setting all the time in natural. It is administered to know mathematics teacher and students view about the gender issues in mathematics. It is more important because it gives real and accurate data for the research study. The interview is one of the major sources of data collection, and it is also one of the most difficult ones to get right. In qualitative research the interview is a form **of** discourse.

Observation note. The class observation note prepared to observe classroom management and physical environment, beginning of class, acquisition of learning used of materials, behavior of students, and behavior of students. Observation note l used to identify the students' activities, teachers' activities, interaction between students-students and students-teachers, classroom management and physical environment of the classroom while teaching\learning in mathematics.

Data Collection Procedure

The school record would study such as mark ledger of students, behavior of teacher, behavior of students and other relevant documents. I recorded the behavior and activities both teacher and students during teaching learning activities. I emphasized on secondary information. The information collected from math's teacher, students. Firstly, for the purpose of the study, I visited selected school of Arghakhanchi district. For the research interview conducted to math's teachers and students to collect required facts. I organized interview schedule in which math's teachers and students. After collecting the data, I interpreted and analyze the data then the finding and conclusion would be drawn.

Data Analysis Procedure

First of all, I organized and edit to collected information from interview and classroom observation then I generated the difference code according to the response of participants. I w gathered/adjust those codes according their similarities and I gave the title for them which are known as theme. At last, I analyzed and interpret those themes by using the related theory of my theoretical framework and conceptual framework which I have developed in literature review. The researcher collected data through interview teacher and students. School records of students helped researcher to

collect data. The collected data in qualitative research is not of structured form and it is time the research had to do a lot in making workable structure of the collected information so as to make the meaning of theory. The various themes generated and using triangulation of field, literature, and my experience interpretation and analysis of data were done.

Quality Standards

Developing standards of quality Lincoln and Guba's classic work shed light on how to assess truth in qualitative report offered four alternate tests of quality that reflect the assumptions of the qualitative paradigm (Khanal, 2019)

Conformability. Conformability refers to the quality of the results produced by an inquiry in terms of how well they are supported by informants who are involved in the study and by events that are independent of the inquiry.

Credibility. Credibility refers to accuracy Description must be plausible and recognized by participants credibility is enhanced by, prolonged time in the field repeatedly observing and interaction with participants, using different data sources, methods, data type, conduction member checks, involving other investigators in the study.

Transferability. Transferability refers to the generalizability of the study finding to other settings, populations and contexts, report must provide sufficient detail so that readers can assess this, Lack of transferability is viewed as a weakness of qualitative methods.

Dependability. Dependability refers to the stability and track ability of the changes in data over time and conditions; want to determine the extent to which another researcher with similar training and rapport with participants would make the same

observations, this is determined by an audit trail, involves auditing research process, documenting all the raw data generated, and assessing method of data analysis.

Ethical Consideration

In the research work, a number of ethical issues will consider to make data collection more standardization and conformity in writing the report of the study. I will consider the following ethical issues

- The researcher granted permission from the school principals and institutions where the survey was going to be conducted.
- The researcher informed the participant if there was necessary for recording filming of photographs.
- The researcher used the name of the institution without its permission.
- The researcher used comfortable language in the data collection process that is easily understandable to the participants and report writing.

Chapter IV

Analysis and Interpretation

This chapter deals with the analysis and interpretation of the collected information of the study. The data collected from the different sources were analyzed and interpreted to explore the gender issues in mathematics at secondary level. The researcher observed the classes regularly for four days. The researcher visited the school, students, and math's teachers. The researcher takes the responses of the respondent during the face-to-face interview were carefully noted. The researcher had observed a mathematics class with a math teacher during teaching-learning activities. Then the classroom observation note was prepared on the basis of the class observation. Every activity and behavior of the student and teacher were carefully observed and noted. The responses of the respondents during faced to face interviews were carefully noted. They were able to express freely whatever they have in their mind to analyze the data.

Analysis and Discussion

The qualitative analysis of interview data helped me construct the four themes associated with gender issues in mathematics education. They are follows

- Participates of the students
- Behavior of the students in the classroom
- Achievement of students in mathematics
- Behavior of teachers

I questioned both male and female teachers. At first "how do family, society, and the school management empower the female students to study mathematics?"

Both males, as well as female teachers' reactions, was similar. She mentioned. From the side of the school \ college management, there is empowerment to students as the

school focused on the bright future of the students, but there is no special orientation program about the importance of mathematics for female students. But it is not positive in the case of family and does not encourage females to study mathematics. I raised the question to the male student "how well does your family and society school management encourages you to study mathematics?" we are encouraged to study mathematics but our female friends are not much encouraged. The female teacher said that mathematics is not subject for female but I came here to study mathematics ignoring want they said. It was my personal decision and self–empowerment to study mathematics

- **Participation of the Students**

Dikshanta. He is a male mathematics teacher of secondary level. He is 48 years old. He is the headteacher of the school. He has been teaching math subjects for 18 years. He completed the B.Ed. in major mathematics. He has three children two sons and one daughter. His voice is very commanding so all students are afraid of him. But he is a very kind person. He loves and cares for students. He is also very happy with his teaching profession. He is a very hard-working person. Here is the answer to my question which is presented as follows:

In my 18 years of experience, there used to be a lot fewer female students than there used to be and more absent than male students. With the change of time, the number and attendance of students are also increasing, in which the number and attendance of female students are also increasing. 90 percent of the boys were students studying elective mathematics and the remaining 10 percent were female students. There is a record that there are no female students studying elective mathematics in any group. But nowadays, even though the number of students is increasing, the attendance

of female students is less than that of male students and both male and female students are more attracted to mathematics so I feel happy.

Sangita. She is a female math teacher of secondary level. She is 42 years old. She has been teaching for ten years. She has two children one son and one daughter. She equally treats her son and daughter and equally loves and cares for both son and daughter. Her husband also a teacher. She is satisfied with her profession. She likes teaching her aim is also to be a math teacher so she is a very hardworking person. She is the favorite teacher of students, the students love her and she also loves to students. She looks beautiful and kind person always smile on her face. Here is the answer to my questions. Which is presented as follows:

The answer of the female teacher is also very similar to the answer of the male teacher.

According to the ladies teacher, they say that in our country, Nepal, there are around two girls equal to one boy, but if you look at the school, the number of female students studying elective mathematics in class nine and class ten is very low. Not all female students are present. I haven't found out how many students are doing very well, but on average, the attendance of male students is more than the attendance of female students. Since we have a tradition that all housework should be done by girls and men, housework. May not be able to go to school. In most families, daughters are still used for household chores and sons are still educated. Male oriented Culture is rooted in our society. Even though I could do all the household chores, I wanted to There was only one girl studying elective mathematics in class 9 and class 10. Another major problem of ladies is menstruation. This is one of the main problems for girls as they are absent every month as it is very difficult during the period. Due to these various reasons, girls' minds are negatively affected, so the participation of girls in difficult subjects like mathematics may be less than that of boys.

- B**ehavior of the Students**

Sangita. She is a female math teacher of the secondary level. She is 42 years old. She has been teaching for ten years. She has two children son and one daughter. She equally treats her son and daughter and equally loves and care both son and daughter. Her husband is also a teacher. She is satisfied with her profession. She likes teaching her aim is also to be a math teacher so she is a very hardworking person. She is the favorite teacher of students, the students love her and she also loves students. She looks beautiful and kind person always smile on her face. Here is the answer to my questions. Which is presented as follows:

Since the boys studying in class 9/10 are 14-15 years old, the boys tend to talk a little more, are shyer and the girls are shyer if the teacher behaves well, the ones who get closer to the female teacher are the ones who share their personal things, so I get closer to the girls a little bit. There are very few female students in class 9-10, so there are very few female students, so we are all close to each other. We have a family environment.

Dikshanta. He is male math teacher of secondary level. He is 48 years old. He is a Head teacher of the school. He has been teaching math subjects since 18 years. He completed the B.Ed. in major mathematics. He has a three child two son and one daughter. His voice is very commanding so all students are afraid of him. But he is very kind person. He loves and care to students. He is also very happy from his teaching profession. He is very hardworking person. Here is the answer to my question which is presented as follows:

Obviously, most of the boys in adolescence are a little more playful and most of the girls are shy. Boys and students are more playful. They are doing activities like

desk, bench, window and door, blowing fan etc. Girls' students are afraid to be embarrassed with a male teacher.

2 Achievement of the Student in the Mathematics

Sangita. She is a female math teacher of secondary level. She is 42 years old. She has been teaching for ten years. She has two children one son and one daughter. She equally treats her son and daughter and equally loves and care both son and daughter. Her husband is also a teacher. She is satisfied with her profession. She likes teaching and her aim was also to be a math teacher so she is a very hardworking person. She is the favorite teacher of students, the students love her and she also loves students. She looks beautiful and kind person always smile on her face. Here is the answer to my questions. Which is presented as follows:

In some ladies, students score better in math than boys students, but normally boys are ahead of girls. Even though 1 \ 2 girls are ahead, girls are more likely to fail in math than boys. Math subject tuition is found to be read by more boys than girls and boys are becoming more active. In other words, the achievement of a boy student is better than that of a girl student.

Dikshanta. He is a male math teacher of secondary level. He is 48 years old. He is the headteacher of the school. He has been teaching math subjects for 18 years. He completed the B.Ed. in major mathematics. He has three children two sons and one daughter. His voice is very commanding so all students are afraid of him. But he is a very kind person. He loves and cares for students. He is also very happy with his teaching profession. He is a very hard-working person. Here is the answer to my question which is presented as follows:

Same as the female teacher answer

3 Behavior of the Teachers

Sarmila. She is female, she is 14 years old. She has one brother. She has been in this study for one class she likes mathematics subject most so she is studying optional mathematics. Her aim to be a nurse. She studies class nine. Her mother is educated and her father is not educated. She is a regular student in the classroom. She is good in mathematics subject and another subject so her performance in mathematics is good. Her family is good. She practices compulsory math and elective math.

Our mathematics teacher is a male teacher who teaches with a good understanding. He treats everyone equally. The boys sometimes make more noise, tease and walk, so sometimes Sir beats them. We treat everyone the same. When we make a mistake, you scold, remind and punish everyone. From time to time, you give motivational speeches and extract activities. Students who fail in math are asked to take a re-exam and students who fail again and again are taught by teaching more. Overall, everyone is treated equally.

Utsab: he is a male student. He is 15 years old. His father and mother are both educated. With 4 members in his family. His sister and his parents. He does like the more mathematic subject but he is an elective math student. He is not so good in mathematics. He likes to play cricket. He is so good in cricket games. His aim to be a cricket player. His family supports him in this game. His favorite subject is English. He attends school regularly. He is active, regular, disciplined student in the classroom. He gets a good environment at home to study but he is not so good in study. His reply presented as follow:

The answer to the male student has a lot in common with the answer to the female student. She treats everyone the same but I think I love girls a little more than

us because they don't do their homework, they are absent, and they laugh a lot. But Sir, don't be as abusive as we are. Don't get angry with girls like us. Class ten male student answer; the math teacher in our class is a female teacher. She is very good nature teachers and teaches well. She treats everyone the same, but she gets along better with a lot of girls. They sit together and play games during lunch breaks. She takes care of the little things of the girls. So I think she loves more girls.

Aabishkar: He is a male student. He is 15 years old. She studies in grade 10. He has been in this for one class. His aim is to be a doctor. He likes mathematics and science subject. Four members of his family have one sister and his parents. His parents are both educated. His mother is a housewife and his father is a doctor. He is a regular student in the classroom and his performance in mathematics is good. His parents always support his study.

The math teacher in our class is a female teacher. She is very good-natured, teaches each well. She treats everyone the same, but she gets along better with a lot of girls. They sit together and play games during lunch breaks. She takes care of the little things of the girls. So I think she loves more girls.

Deepsikha: We are very close with mam, we share everything, and he helps us in everything.

Episode 1

It was the first class observation in the third period of grade X. After the researcher entered with the subject teacher into the classroom, the students stood up and said, and “Good morning teachers”. The subject teacher told them to sit down. All the students looked curiously towards the researcher the subject teacher introduced the

researcher as a teacher. It was noticed that the school environment was respectable to the teacher. The 37 students in the class. Among them were 18 boys and 19 girls. The subject teacher taught equations. He reviewed the lesson by providing some pre-concepts. The students were listening carefully looking up the whiteboard. He described and solved the equations on the whiteboard. The teacher asked students to solve this equation on the whiteboard. The boy student failed to solve equations in the whiteboard. The teacher encouraged me to ask if there were any confusion. The teacher again taught the same equation and again asked to solve it. The girl student succeeded to solve the equation on the whiteboard. The teacher appreciated her immediately. He praised concentration.

From the above-observed episode, it is concluded that the teacher appreciated when the students were successful to give the right answer to questions asked by the teacher. When they failed to give correct answers or they did not understand what the teacher taught, he encouraged and motivated the students to ask without any problems. The boys were forward in studying than girls.

Episode 2

It was second-class observation in the third period of grade X. The teacher had entered in class textbooks book and marker only. He had not any kids of teaching materials to be shown to the student or to be displayed in the classroom. He wrote the topic “LCM of algebra” on the whiteboard and started to teach. He reviews the previous lesson. He had done one question on the whiteboard then he told the student to solve the questions and he checked the copy of the students. The teacher solved another question then he told the question to solve to the student. After some time he checks the copy of students. All students solved the problem. Some students showed a copy of

another student. The teacher said, ask if there are any questions. The teacher discussed the topic then the teacher said the student to do the remaining exercise as the homework assignment and he said the class was over.

The above response shows that the classroom is student-dominated. The co-operative between teacher and students could be established. I feel the teacher treated all the students equally. The teacher's voice is very commanding so I found that girls were more afraid of a teacher than boys. The maximum girls' students were shy nature. Social constructivism theory emphasis on the teacher should help the learner to get him or her understanding of the content, teacher should previous guidelines and create the environment for the learner to arrive at his or her own conclusions. Thus concluded that there is known proper interaction between students and teachers. The interaction in mathematics classroom teacher and students may be a whole-class presentation and practicing problem-solving investigation or projects etc. any of these approaches could be seen in the observed classroom.

Episode 3

It was the third class observation in the last period of grade IX. The researcher went into the classroom with the subject teacher in the last period. 31 students in the class. Among them 19 girls and 12 boys students. But a total of 10 students was in optional mathematics. Among them 3 girls and 7 boys students. The students were making noise when the teacher and researcher entered the classroom. After greeting the teachers, they remained silent. The teacher is a female teacher. The classroom was so wide but students were few. 16 benches were arranged in two columns. The seating arrangement was separated for girls and boys. The teacher taught on the topic of the matrix. At first, she reviews the previous lesson by solving the problems from the book

by explaining them step by step. She gave a similar problem to the students to solve. The teacher just walked into the classroom and guided them. More students did not solve the problem. The teacher came to the whiteboard and explained the problem and how to solve it. At last, she gave some questions as homework and she told to the monitor to collect the day before homework and to bring it at the office. The teacher told the researcher, “If checked the homework in the classroom then I could not get time to teach the course, so I checked homework during at leisure period at the office”.

From the above-observed episode, it is concluded that the physical facilities in the classroom, as well as seating arrangement, were appropriate for mathematics learning. The girls and boys were seated separate. Every girl in the class had equal opportunities to get interact with the teacher. Generally the student who sat at the first bench or at the side got more opportunities to interact with teacher. Teacher also solved the problem in those copies which were easily an accessed. So girls got more possibilities to interact with teacher which enhance their learning in mathematics.

Episode 4: During the fourth-day class observation it was the last period of grade IX. At first, she gave the copies to students. The mathematics teacher entered into the classroom with the daily using and other limited teaching materials which were related to the topics. The teacher left the teaching materials in front of the students’ desks and reviewed the previous lesson. She wrote the topic of that day ‘matric’. She described matric with example. Then she let the students solve the related problems. Students were asked about how they solved these questions then she solved the questions again. Then she checked students’ copies and guided them to their mistakes. Finally. She summarized the topic and gave homework.

From this observation, it is seen that trained teachers were also not implementing their skills in the real classroom appropriately. In the observed school, there were some paper-made materials related to the topic but the teacher did not use them. If she used those materials then it would be easier to make students clear about the matrix. The place of placing presentation and summarization skills of instructional materials gained in training sessions were not also found to be transferred in the real classroom. But she is much closed with students, especially girls' students.

Overall, from the above classroom observation and case respondents, it is found that both male and female mathematics teachers were very close with students, both teachers were loved and care to students. They equally treat girls' students and boys' students. In the classroom observation not got any gender issues. All the teachers were found to have in favor of supervision of the classroom teaching. However, their supervision was limited to knowing whether the teacher was in the classroom or not and the course would be completed in time or not. And also, it was found that the school supervisors were used to coming to their school for some time only and especially talked to the head teacher but they did not observe the class regular.

Chapter V

Finding, Conclusions, and Implications

This chapter includes that a summary of the whole study. It also includes findings and conclusions derived from the analysis and interpretation of the previous chapter and finally recommends how these findings can be used in the academic field. This chapter concerns in the following sections;

Finding of the Study

The following point was observed while conducting this study which are the major findings of the research.

This study found that school policy hasn't been concerned about mathematics achievement. There was no library and sufficient learning materials in school which effect student's achievement. The boys are very clever then the girls students. The boys are more near with teachers. The boys are more talent than girls. Boys are more than girls in the elective mathematics, 4 boys and one girls in class nine total number of students was 42 in which 24 girls' students and 18 boys students. Being a male oriented society girls were found to have to more housework. Due to which he is no allowed to go to school regularly.

The maximum girls are very nature so these girls are afraid of teacher. The girls could not ask the things that were on yourself mind so they could not understand the content well.This study found that, lack of school policy, lack of student's time management, lack of text in mathematics subject are major factors that affect in student's mathematics achievement at the secondary level.

Another major reason is ladies can't be regular is menstruation. It is not possible to go to school due to a lack of proper toilet facilities. The look at period time is also different. The study found that the math teachers equally treat all male and female students not focusing on talented students not focus on loser students. So talented students become more talented and loser students more losers.The study found that math subject many people find it difficult, especially ladies students who are afraid to study elective math subjects.

Conclusion

From the above finding of this research, it is concluded that the girls' students' achievement in mathematics is lower than boys' students in the secondary level. These activities motivate girls to be absent in the classroom, to do homework, assignments. Psychologically, it reduces the interest to study and practice mathematics. Boys spent most of time in entertainment than in mathematics study and practice even they have good environment to practice mathematics. And girls are sincere in their responsibilities and mange time for practice mathematics even they have not satisfactory environment and not enough time to practice mathematics. I concluded that the mathematics achievement of boys is higher that of girls. It was conducted that there are many aspects of school and out-of-school-related gender issues in mathematics learning. The management committee was not looked after any exam to be taken regularly as not. Some students are not regular in the classroom. The main occupation of parents is agriculture. The parents love care boys more than daughters. It is still customary to send tuition to the son and employ the daughter in the housework. Giving the son a lot of time to study at home also makes the daughter work so the girls pay more attention to less of the house to the education of the daughter. Lack of teaching materials and

adequate instructional materials were caused by being weak in mathematics learn in school must manage new policies for the improvement of the teaching process. Maximum girls' students are shy nature so the girls' students are afraid of teachers.

Girls and boys are biologically different but their roles, status, position, responsibility are somewhat the same. In our male domain society, there is a different way to see the female from the point of view of mathematics education. There is a belief that female is not able to grasp technical subjects such as mathematics science and therefore is unable to teach. While interacting with male and female teachers and male and female students at the secondary level. And summing up their view. I found this subject to male domain in society. As our Nepali society is rooted in a male-oriented society, no matter how many children are equal, they do not seem to be equal in behavior. Due to the mentality that the daughter has to do the housework, there is less time to study as she has to do the housework, so there is less focus on reading but in school, boys and girls were treated equally. It was found that the teachers helped the students with the idea that the girls should go further. Despite the same treatment in the school, the achievement of the girls was found to be less than that of the boys. But I did not get any gender issues in the classroom. All teachers equally treated male students and female students. Female students were shyer. The number of female students is less than the number of male students in optional mathematics subjects.

Our country Nepal is a male-oriented country. Sons are given priority over daughters the daughter is sent to government school and sons to private schools is still not over. In this study, I concluded that there are main factors which are gender issues in mathematics at secondary level students such as the behavior of teachers, achievement of students in mathematics, educational system, poor management, the

interest of learner in mathematics, educational environment at school and home and time schedule, etc.

Implications of the study

From the above findings and conclusions, the researchers would like to suggest some implications for the improvement of mathematics learning of the mathematics. In the context of Nepal, many students have low learning in mathematics and the trend is still continuing. Continuous assessment system, implementation of the operational mechanism and its continuous analysis, a change from syllabus focus to students' outcomes as well as move from teacher-directed classrooms to students centered learning is necessary to maintain quality education at school. From the above findings and conclusions, the researcher would like to suggest some implications for the improvement of mathematics learning of the mathematics.

- It is suggested to involve the teacher's parents, headmaster, and educational planners to identify the factors which affect the mathematics achievement of girls' students and their minimization or elimination technique as far as possible.
- Since it is found that the mathematics achievement of girl students is more affected by the school environment and interest of learner and teacher's behavior negatively affected by the school environment. So it suggested improving the effective classroom teaching, teacher's behavior, peer's behavior, time variable and interest of learner to get better achievement in mathematics of girl students.

- This study is limited only to secondary lever but a similar study can be done for higher secondary levels.
- This study helps to find out the way to decrease the failure rate of the female students.
- The study helps for students to be aware to be aware of the main problem of the mathematics to adopted required strategies for the improvement.
- It suggest, tuitions and extract classed must be provided for improvement in mathematics learning.

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Appendix A

Classroom Observation Note

The classroom observation note prepares on the basis of the following indicators being a participant with the mathematics teacher during teaching-learning activities.

Teacher's name:

Grade: No. of student:

- Physical environment of the classroom.
- Teaching-learning activities.
    I. Begging of the class
    II. Setting the stage for learning.
    III. Closure of lesson

- Allows for student involvement.
- Checks the understanding of students.
- Review the learning of the day to set the stage for the next learning.
- Provide assignment/housework/project work relevant to the learning that has been practiced with guidance.

Appendix B

Guidelines for Interviewing Mathematics Teacher

The interview with mathematics teacher took on the basis of following topics.

Name:

Qualification:

Teaching experience:

- School facilities:
- Relation with teacher and students
- Classroom management
- Behavior of students in the classroom
- Achievement of the students in mathematics

Appendix C

Guidelines for Interviewing Students

Name:

Sex:

- Opining no facilities of the school:
- Opinion towards mathematics learning in the classroom:
- Family background:
- Behavior of the students:
- Opinion towards causes of low learning in classroom: