

PROBLEMS FACED BY STUDENTS IN LEARNING

DERIVATIVES

AT SECONDARY LEVEL

THESIS

BY

VIJAY KUMAR MAHATO

FOR THE PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF MASTER OF EDUCATION

SUBMITTED

TO

DEPARTMENT OF MATHEMATICS EDUCATION

CENTRAL DEPARTMENT OF EDUCATION

UNIVERSITY CAMPUS

TRIBHUVAN UNIVERSITY

KIRTIPUR, KATHMANDU

2019

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A
Thesis
By
Vijay Kumar Mahato

Entitled
"Problems Faced by Students in Learning Derivatives at Secondary Level"
has been Approved in partial fulfillment of the Requirement for the Degree of
Master of Education

Committee for the Viva-voce

Signature

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CERTIFICATE

This is to certify that Vijay Kumar Mahato student of academic year. 2069-2070 with T.U. Regd. No.: 6-1-14-203-2005. Campus Roll No: 1994. Thesis resister number 1175 and Exam Roll No:281274 . has completed this thesis under my supervision, during the period prescribed by the rules and regulations of Tribhuwan University Nepal. The thesis entitled "Problems faced by learning Derivatives at Secondary level" embodies the results of his investigation conducted during the period of January 2019 to March 201 under the Department of Mathematics Education, Tribhuwan University, Kirtipur Kathmandu. I hereby recommend and forward that his thesis is submitted for the evaluation and for awarding the degree of Master of Education.

.....

Laxmi Narayan Yadav

Head

Date:-.....

.....

Dr. Bed Raj Acharya

Supervisor

Date:-.....

ACKNOWLEDGEMENT

At first obligation goes to the Department of Mathematics Education Tribhuwan University, Kirtipur for providing me an opportunity to carry out this study.

I am very much indebted to Prof. Bed Raj Acharya, Department of Mathematics Education, my supervisor whose painstaking efforts in providing me with scholarly guidance and constant encouragement made this research feasible to complete in time. I am equally indebted to my respected teachers Prof. Laxmi Narayan Yadav. Head of the Department Mathematics Education. Mrs. Bimala Mishra and to all respected teachers of Mathematics Department for their valuable comments and suggestions.

Similarly, I would like to express my thankfulness to my respected parents Mr. Shiv Diyal Mahato and Mis Inear Devi Mahato for their great supports during my study career. Also the suggestions and encouragement of my wife Mrs. Babita Mahato remained valuable in completion of the research. Thanks a lot to my Brother Pujan Kumar Mahato and friend Surendra shah for their suggestions and help during the preparation of this study.

Date:.....

.....

Vijay Kumar Mahato

DEDICATION

To

My respected Parents, Shree Shiv Diyal Mahato and Iner Devi Mahato who have devoted their entire life to uplift and enlighten my life

ABSTRACT

The main target of this research was to find out the causes of problems faced by Mathematics teachers and students while teaching/ learning derivatives at grade 11 of higher secondary school. The design of the study was qualitative . The research was conducted in two secondary schools of Mahottari district and mathematics students and one mathematics teacher from each school where from sample of the study. The tools used in data collection procedure are classroom observation from and open ended interview formats for both teachers and students. so the methodologies of the research were classroom observation and face to face interview.

The result showed that the faced problems on teaching/learning derivatives are related to learning environment of the sample school; like pre-knowledge. classroom instruction; teachers and students characteristics; and teaching methods materials and evaluation technique.

The aforementioned problems are due to students; weak pre-knowledge about function, geometry and co-ordinate etc. Unique cognitive structure and lack of students project works. Teachers do not access modern teaching techniques materials and evaluation at teaching due to lack of idea to generate locally available materials.

Overall, derivatives learning has someone to be exam oriented rather than practical oriented. it is a new concept ; so it is difficult to create interest for the students.

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LIST OF ABBREVIATIONS

M. Ed.	Master's in Education
M. A.	Master's in Art
B. Ed.	Bachelor's in Education
NESP	National Education System Plan
OALD	Oxford Advanced Learner's Dictionary
T.U.	Tribhuvan University
USA	United States of America
CDC	Curriculum Development Centre
DEO	District Education Office
Dr.	Doctor
Prof.	Professor
Assoc	Associate
ICME	International Committee of Mathematics Education
PCK	Pedagogical Content Knowledge
PCL	Proficiency Certificate Level
JHSS	Janta Higher Secondary School
PHSS	Pashupati Higher Secondary School
HSEB	Higher Secondary Education Board

Chapter-I

INTRODUCTIONS

Background of the Study

Mathematics has been vital to the development of civilization from ancient to modern times. Mathematics is a social product which is widely studied with its usefulness. Mathematics arose from the needs of organized societies of people. so that mathematics is created by the mind of the man and is, therefore, primarily concerned with ideas, process is and reasoning that are is important for source of our daily life problems. The image of mathematics is different for different people. Some enjoy it others do not, some seek to use it, others avoid it.

The term 'Mathematics' has been interpreted and explained in various ways it is the numerical and calculation part of man's life and knowledge. it is also defined as the science of abstract form.

The mathematics educators faced a challenge to define what might be considered the minimal mathematical competencies that are expected to the term "Mathematics" that t has been interpreted and explained in various ways. According to oxford dictionary; "Mathematics is the science of number and space." and famous 20th centuries Mathematician Albert Einstein defined, "Mathematics is a free invention of the human intellect" (Upadhyay, 2004). Thus, the term "Mathematics" has been interpreted and explained in various ways. It is the numerical and knowledge. It is also defined as the science of abstract form.

The mathematics educator faced a challenge to define. What might be considered the minimal mathematical competencies that are expected to the enlightened citizenship in contemporary society. Although, it is impossible to find a universal agreement on such things. it is nevertheless the duty of the professional

organization of mathematics teachers to propose what might be considered a reasonable approximate to such a statement of competence present day society collectively; however, needs a great deal of the most sophisticated kind of mathematics for its functioning. The highly complex problems of the theoretical society require complex mathematics to solve them. Most of the mathematical structures, rules, formulae etc. were the outcome of the empirical observation and experiences of ancient period. But now, the empirical mathematics developed into abstract mathematical theory without knowledge of mathematics, it is very difficult for better understanding of the other disciplines like chemistry, physics, social science, economics, psychology, engineering and so on. It is interpreted as a mathematical model, without having mathematical knowledge; it is very difficult to understand those disciplines. Thus, mathematics is intimately involved in every moment of every one's life and every discipline of humans civilizations. Upadhyay (2004) writes that the first international congress of mathematics education held in Lyon France in August in 1969 was the first milestone in establishing mathematics education as a separate discipline. The fifth International conference on Mathematics education (ICME-V) realized the importance of mathematics education through the plenary lectures of the congress. Actually, Mathematics education is the study of educational aspect of mathematics. In the context of Nepal, mathematics teaching has been started through the ancient period but there were not rigid curriculum and definite objective. But in this period, mathematics has been accepted as one of the components of education system. Since the time of Vedic period "Gurukul" was the education system of Vedic era.

In "Gurukul" system the Vedic name "Ganita" for mathematics consists of astronomy as well as art. But there were problems of mathematics curriculum subject teacher, instructional materials, and method of teaching at that time. Formally

mathematics was included as a subject of instruction in every level with the establishment of Darbar high school in 1910 Ashwin 27th B.S. during Rana Regime. The National education system plan (NESP) lasted 1971-1976. First comprehensive education plans brought a very significant change in mathematics education in the country-NESP. Clearly stated the importance of mathematics education in this way "Mathematics like language, is a basic tool of communications involves which the frequent use of mathematical concept. Thus, it is quite natural that mathematics should be given a very important place second to language in school education (Sharma, 2066) .

Learning can be defined as the modification of behavior through experience and training. it is concerned as the permanent change in one's behavior. Learning takes place through birth to death that enables to learner for gaining skills to solve his /her daily problems and thus adjust his/her life. Learning derivatives in mathematics is in the logical arrangement of quantity and many related concepts. The Derivatives is the fundamental notation of calculus. Derivatives is one of the important concepts in calculus because of its use to construct other mathematical ideas. Bezui Denhout (2001) states that students' failure to express meaningful ideas in calculus to a large extent is due to inappropriate and weak mental links between knowledge of 'Derivatives' and knowledge of other calculus concepts, such as 'Limit', Continuity, and integral for the concept of definite integral. Derivatives process is essential for constructing the rate of the change areas under a curve. Calculus is one of the most useful and important branches of algebra and geometry. It is the study of 'Rate of change' The word 'calculus' originally meant a small stone or pebble. The dy/dx $d'y/dx$ notation of Derivatives was defined by 19th century French mathematician August in Louise Cauchy(Basic Mathematics of class ix) and it was later formalized and made logically

rigorous in the 19th century by the German mathematician Karl Weierstrass. [Eves 1989, 5th edition p. 226]. In our daily life, we use the word "Derivatives" quite often. for example; Derivatives of the expenses of our daily necessities, Mathematical problems-solving can have students improve their analytic powers and can add them in applying these powers in diverse situation. Problems relating to Derivatives of mathematics learning is directly affected the achievement in teaching Mathematics.

Mathematical problem-solving is the resolution of a situation in Mathematics which is regarded as a problem by the person who resolves it. Mathematical problem-solving can help students improve their analytic powers and can add them in applying powers and can them in applying these powers in diverse situation. Solving-problems can help students to learn mathematical facts, skills, concepts and principles by illustrating the applications of mathematical objectives problems relating to Derivatives in mathematic. Learning directly affect the achievement in teaching mathematics. This is a great threat to the mathematics teachers and students .

The higher level education was started after the establishment of Tri-chandra college in 1975 B.S. All educationist, curriculum experts, psychologists and subjects experts accept and argue that ten years school education system is not adequate for the students of present globalization who have to complete globally for the adjustment of the future life. To maintain the standard of the education, it needs to change the existing educational structure. To fulfill this need the education institutions of the world has changed their schools structure and added their two year course in their school systems. Consequently, Nepal has changed its school structure to make educational system as much as compatible and comparable with the educational by them of the SAARC countries along with international standard. Thus, Nepal has instructed higher education system since 2046 B.S. under the HSEB. Mathematics is an essential part of school curriculum as well as higher level curriculum so, it is taught as compulsory and

optional subjects at school level. Mathematics is included as specialization mathematics at higher level for the students. In this way, the topic "Derivatives" is included at intermediate level. At grade XI "Derivatives has been kept in the course of study and it contains 15 teaching hours. It contains some topics like notation of "Derivatives" fundamental theorem on Derivatives use of evaluating Derivatives involving simple algebraic and trigonometric functions.

Statement of the Problems

In general, it can be seen that Derivative teaching is an essential part of one's daily life .In this way without knowledge of Derivatives, we cannot learn more in every field. Teachers and students are facing many kinds of problems during the teaching and learning Derivatives. Previous studies have given some evidences for the existence of the prombles, such as lack of pre-knowledge about functions; Geometry etc; Lack of appropriate teaching methods and materials; lack of students motivation as observed by the teacher; poor knowledge in pedagogy; lack of discipline, etc. The problems of this study are to find out the causes of problems during teaching learning Derivatives. The research questions set for this study were as follows.

1. what are the teachers and students facing the problem while teaching and learning derivative in grade 11.
2. What are the problems related to pre-concept of students for learning Derivatives

Objectives of the Study

The objectives of the study were as follows:

-) To identity the problems faced during teaching and learning derivatives at grade XI in mathematics class.
-) To find out causes of the facing problems during teaching and learning derivatives at grade XI in mathematics .

Significance of the Study

Previous researchers had found problems in their research work or case study based on basic education at secondary level mathematics. But this study tried to identify the facing problems on Derivatives as well as their cause during teaching and learning at secondary school. Also it would help to school sector reform program (SSRP) to improve curriculum because it is trying to lead out 10+2 as higher secondary level and drop it at secondary level. Most of the teachers as well as students assume Derivatives as difficult topic, abstract and burden chapter and most of teachers give low priority to teach Derivatives in the classes and also Derivatives is new chapter at class XI.

The following are significance of the study:

-) It would be helpful to teachers and students for teaching and learning Derivatives .
-) It would provide information to the concerned agencies to reform and improve the mathematics teaching at higher secondary level.
-) It would be helpful to researchers for further research in teaching and learning Derivatives .
-) Most of the students know how to solve the questions of Derivatives but they do not know about actual concepts of Derivatives so it would help to all students as well as teachers to understand mathematical skills and concepts of Derivatives .
-) It would be beneficial to policy makers ,educationists, mathematics educators to make further curriculum policies.

Thus, the purpose of the presents study was to identify the problems faced by teachers and students in teaching and learning Derivatives. This study tried to identify the problems and logical and valuable information about the current problems of

teaching and learning Derivatives faced by higher mathematics teachers and students.

Delimitation of the study

The research was carried out in two schools of Mohottari district because only two schools provide of mathematics subjects at grade XI out of all higher secondary schools. The study was carried out with small number of respondents. Actually, there were these mathematics students and teachers at grade XI of sample schools. Qualitative method like case study was done in this research. Researcher's aim was to have deep study of problems and their causes a in Derivatives unit, instead the broad study on various units of mathematics.

Chapter-II

REVIEW OF RELATED LITERATURE

Review of related literature is an essential part of the research because related literature helps and guides researchers to meet research objects. The main purpose of review of related literature is to find out what works have been done in the area of the research problems under study and what has not been done in the field of the research study being undertaken. The review of related literatures is useful to make the concept about the study clear and also directs to analyze and interpret the data. The researchers have reviewed some related literature useful to make the concept about the study clear and also directs to analyze and interpret the data. The researcher has reviewed some related literature that as follows:

Empirical literatures

Amatya (1978) conducted a thesis entitled "A comparative study on the effectiveness of teaching mathematics with and without the use of instructional materials". He had divided the class into two groups these are: control and experimental groups to teach using materials and find the conclusion by using Z-test. He concluded that the achievement of students taught by using instructional materials is significantly higher than the achievement of students taught without instructional materials .

Lamichhane (2010) did a survey type research on the topic "A study of problems faced by the secondary level mathematics teacher in teaching mathematics" in Kaski district. The main objectives to identified the problems being faced by the secondary level mathematics teachers in teaching mathematician to compare those problems in the rural and urban areas. He finds problems proposed up in the eyes of the teachers and the problems faced by the urban teachers were not significantly different from those of rural teachers.

Hatice Akkoe (2012) conducted a research thesis "pedagogical content knowledge of define integral; The problems of Derivatives 'The study investigates prospective mathematics teachers' pedagogical content knowledge (PCK) of definite integral, considering the notion of PCKas described by Shulman (1986-1987) We will investigate prospective mathematics teachers ' knowledge of student difficulties in relation to the Derivatives process to define definite integral. for that purpose ,four prospective mathematics teachers were observed during their micro-teaching and were interviewed afterwards, micro- teaching videos, interview transcripts, prospective teachers" lesson plans and teaching notes were analyzed .In this presentation, we will discuss how prospective teachers addressed students difficulties for the Derivatives process when constructing the rate of the curve and change of the rate and consider the implicative in terms of PCK.

Pathak (2012) conducted a thesis "The problems faced by the teachers of Kathmandu district in the implementation of mathematics curriculum for lower secondary schools of Kathmandu district. He administrated a set of questionnaire to the lower secondary mathematics teachers who had faced the problems regarding the problems of mathematics curriculum teaching methods evaluation techniques. Then, he concluded that the problems regarding the evaluation were the most serious problems to the lower secondary lever mathematics teachers.

Thapa(2005) conducted a thesis entitled "A study on the problem faced by teacher in teaching mathematics at primary level" she concluded that teacher are facing many problems due to large size, irrelevancy of teacher guide, lack of instructional materials, lack of supervisory help and so on. In many mathematics teaching, teaching techniques are such aids which are used to make the lesson interesting to explain the content and to remember it by heart during teaching techniques. Teaching or instruction strategies

refer to a pattern of teaching acts that serve to attain certain outcomes and to guard against others. There are several methods of students and some are impasizing in the supreme sorce to as a teacher. Among the inductive method, discovery method, filled trip method, discussion method, heuristic method, project method, etc. are the student centered methods, which also emphasizes on the active participation of the student.

Dhakal (2002) conducted a thesis entitled "A study on the Attitude of the Students towards mathematics education as a major subject at (10+2) secondary and PCL Level at Kathmandu valley "The aim of his study was to find out students reference books and contents. He did set other objective to compare the attitudes of boys and girls towards mathematics education. He applied chi-square test, T-test to conclude that all the students have negative attitudes towards their mathematics classroom their attitude remains positive to the well organized mathematical classroom and they have positive attitudes towards mathematics textbooks and reference books .Bent and et al (1949) have showed the " relation of secondary to higher education. They write " The secondary schools provide the educational foundation for adult life or for continued education, higher schools recognize their responsibilities to students planning enter an institute of higher education as well as to those who will enter some vocational pursuit immediately " (p. 157).

Butler and Wren (1970) state the following problem in studying geometry:

-) Inability to read well and to understand clearly the meaning of theorems or problems.
-) Inabilities to restate theorems.
-) Failing to have the background of geometrical information in organized manner so that it could aids to facilitate the search for theories or postulates which might be helping in given situations:

-) Not knowing how to get started.
-) Failing to justify each stable in the proof leaving weak links.
-) Trying to memorize proofs sometimes without understanding them.
-) Poor drawing and sketching of geometrical figure.
-) Drawing conclusion merely form the appearance of figures and diagrams.

Shah (2008) conducted a thesis on the topic " A study on Problem Faced by Students and Teacher in Teaching - Learning Vector " He conducted that vector teaching - learning is not satisfactory in Kavreplanchok district; both students and teachers have been facing problem during teachbing - learning vector. It was also found that the causes of problems.

The following problems are found:

-) Problems related to pre -knowledge of the students.
-) Problems related to learning environment of the school .
-) Problems related to evaluation techniques .
-) Problems related to mathematical instruction, methods and materials on teaching vector.
-) Problem related to teachers and students attitude, beliefs interest,

After reviewing of all the related literature researcher found that there has not been research in such topic .Therefore, selected topic is seen appropriate for research and above reviews of literature supports to conduct her search.

Theoretical literatures

A teaching/ learning model is a generalized instructional process which may be used for many different topics in a variety of subjects. There are many teaching /learning models which can be used effectively for the analysis and interpretation of data such as game model, spiral model, problem solving model, inquiry model and expository model and so on.

The problems on teaching/learning in topic Derivatives are considered as the problems of Mathematics. This case study is focuses to identify whether the problems on teaching/learning occurs and the cause of problems on Derivatives. so, researcher is analysis and interpretation of data by using Ausubel's expository teaching /learning model.

Expository teaching /learning model

The learning theorist David p. Ausubel has developed "Expository teaching /learning model in 1950 and argued that expository teaching was the only efficient way to transmit the accumulated discovering of countless generations to each succeeding generation and that many of the recently popular methods were not only inefficient, but were also ineffective in promoting meaningful learning .The objectives of Ausubel's meaning verbal learning are:-

-) To motive the learner for learning.
-) To emphasize on previous knowledge for teaching.
-) To provide conceptual structure of the discipline to the learner.
-) To reach the mathematics meaningfully and practically.
-) To teach the mathematics effectively by expository method. and
-) To teach mathematics concepts relating between the structure of the discipline and learner's cognitive structure.

Psychological Foundations of Concepts Map

The question sometimes arises as to the origin of our first concepts. These are acquired by children during the ages of birth to three years ,when they recognize regularities in world around them and begin to identify language label or symbols for these regularities (Macnamara, 1982). This early learning of concepts is primarily a discovery learning process, where the individual discerns patterns or regularities in events or objects and recognizes them as the same regularities labeled by older persons with words or symbols. This is a phenomenal ability that is a part of the evolutionary heritage of all normal human beings. After age 3 new concepts and propositional learning is mediated heavily by language, and takes place primarily by a reception learning process where new meanings are obtained by asking questions and getting clarification of relationships between old concepts and propositions and prepositions. This acquisition is mediated in a very important way when concrete experiences or props are available ; hence the important of "hands -on " activity for science learning with young children, but this is also true with learners of any age and in any subjects matter domain.

In addition, to the distinction between the discovery learning process, where the attributes of concepts are identified autonomously by the learners, and the reception of learning process, where attributes of concepts are described using language and transmitted to the learner, Ausubel made the very important distinction between rote learning and meaningful learning. meaningful learning requires three conditions ;

The material to be learned must be conceptually clear and presented with language and examples relatable to the learner 's prior-knowledge. Concept maps can be helpful to meet this condition, both by identifying large general concepts held by the learner prior to instruction on more specific concept, and

by assisting in the sequencing of learning tasks though progressively more explicit knowledge that can be anchored into developing conceptual frameworks.

The learner must process relevant prior language. This condition can be met after age 3 for virtually any domain of subjects matter, but it is necessary to be careful and explicitly in building concepts frameworks if one hopes to present detailed specific knowledge in any field in subsequent lessons. We see, therefore, that conditions one and two are interrelated and both are important.

The learner must choose to learn meaningfully. The one condition over which the teacher or mentor has only indirect control is the motivation of students to choose to learn by attempting to incorporate new meaning into prior knowledge, rather than simply memorizing concept definitions or propositional statements or computational procedures. The indirect control over this choice is primarily in instructional strategies used. Instructional strategies used and the evaluation strategies used. Instructional strategies that emphasize relating new knowledge. Evaluation strategies that encourages learners to relate ideas they possess with new ideas also encourages meaningful learning

As noted above, it is important to recognize that because individuals vary in the quantity and quality of the relevant knowledge that possess, and in the strength of their motivation to seek ways to incorporate new knowledge into relevant knowledge they already possess, the rote meaningful distinction is not a simple dichotomy but rather a continuum. Creativity can be seen as a very high level of meaningful learning, and we will discuss this further, these ideas are shown in figure

Conceptual Framework



Source: Paudel (2007), Shah (2008), Pathak (2010)

Learning can vary from highly rote to highly meaningful. Creativity results from very high levels of meaningful learning. People often confuse rote learning and meaningful learning with training approaches that can vary on a continuum from direct presentation of information (which may be conceptually obscure or conceptually explicit) to autonomous discovery approaches where the learner perceives the regularities and constructs his/her own concepts, both direct presentation and discovery teaching methods can lead to highly rote or highly meaningful learning by the learner, depend on the disposition of the learner and the organization of the instructional materials, (Mayer, 2004; Kirschner et al; 2006; Sweller et al; 2007). ([http://map.ihme.us/publications/research paper/theoryca maps](http://map.ihme.us/publications/research%20paper/theoryca%20maps)).

Expository Meaningful Verbal Learning Theory and its Application in teaching-learning.

Teacher should motivate the students and relate the new concepts with pre - knowledge of the students so that students will be positive in the concepts and read to learn. Teaching should done according to the need and interest of the students in meaningful way. Hence, the students pre knowledge plays a most important role to mastery in learning limit .The teacher should determine the step that to be in sequential structure where teacher should describe each steps meaningful and appropriately otherwise students cannot learn in meaningful way. Description of each step of learning is possible only in good expository method as that it is application in meaningful learning and weak students can learn easily. Teaching materials should be meaningful to the learner .To ensure meaningful learning the teacher must helps students to built linkages between their own cognitive structures and structure of the discipline being taught .

Mathematics teaching should be done by using teaching materials related to subject matter to make teaching effective permanent and meaningful. It is possible only by discovery method. Each new concept and principle within the discipline must be related to relevant. Previously learning concepts and principles which are in the in the learner's cognitive structure. The integrative reconditions principle imply that new information about the discipline being studied should be recognized and integrated with previously learned information from that discipline. The teaching learning sequence should be structured so that each new lesson is carefully related to and built upon previous learning. It should be noted that although. Ausubel says that each part of the discipline should be integrated with other parts, he does not support each integrating the structures of various distinguishing characteristic of the expository model is that it is teacher

dominated, that is; the teacher controls the follows of the lesson by presenting information and demonstration solutions to problems. This model is well suited for teaching mathematics because material can be organized to the class in an efficient manner. When used by the perspectives teacher who provides for frequent interactions with students. The expository model can be very effective for teaching many topics in mathematics many inexperienced teachers, who are quite naturally concerned with their own teaching style and correct presentation of mathematical content, tend to lecture on mathematics while giving scant attention to any student reactions which are short of discipline problems. After a few weeks or months of teaching experiences, most mathematics teachers overcome their self-centered teaching methods, become confident in their own knowledge and comprehension of mathematics, and develop a teaching style that permits them to concentrate upon students rather than upon themselves and the subjects. Good lectures observe the facial expressions and other reactions of their students and make minute-by-minute adjustment in their lectures according to students' behaviors. Boredoms, confusions, and inattentiveness tend to be reflected in students' postures and facial expression and the perspectives of teacher can evaluate the effectiveness of his or her lecture by paying attention to these students behaviors.

In an expository teaching strategy needs teachers can ask questions, respond to students-initiated questions, and encourage class discussions and comments during each lesson. Although it may appear to be an effective procedure to pause occasionally during and ask "Are there any questions?" or "Does anyone have a comment?" these questions seldom elicit responses. The teachers own attitudes and behaviors towards questions and discussions will tend to either generate or stifle students' participation in an expository lesson. Frequent teacher responses such as "You should know the answer

to your own question." That's not a very good question." Or "That comment has nothing to do with the lesson ." Even negative facial expressions on the part of the teacher can discourage students' participation. Students will learn to ask questions when they are confused if teachers react with sensitivity and empathy to each question. Teachers sometimes exhibit four common shortcomings when processing the information contained in students' answers to questions. First ,some teachers know what they want for an answer. Second, some teachers do not analyze and evaluate answers ,especially wrong answer to questions. Third, many teachers tend to reword a repeat student' answers to questions. Fourth, some teachers ask a question, call upon a students for an answer, and then do not give the student enough time to formulate a response.

Chapter IV

METHODOLOGY

This study is essentially qualitative type. Mainly, design of the study, population of the study, site selection and sample of the study, tools for data collection, data collection procedure and data analysis procedure are described as below:

Design of the Study

It is the qualitative research so, design of this research is explanatory case study ; problems faced by teachers and students in teaching /learning Derivatives of grade XI. Case study research is an empirical inquiry that investigates contemporary phenomenon within its real-life context. It is a depth study in particular person because I take in this method for study in mathematics derivatives learning.

Site Selection and Sample of the Study

According to academic session 2073/2074 B.S. announced by HSEB, there are only twenty five Higher secondary schools in Mahottari District. But only schools Shree Janta Higher Secondary School (JHSS) and Shree Pashupatinath Higher Secondary School (PHSS) have provided mathematics education at grade XI. So researcher selected these two higher secondary schools as a sample for his research. JHSS has twelve mathematics students and one mathematics teacher also similarly; PHSS has eight mathematics students and one mathematics teacher at grade XI.

Actually, researcher selected only five mathematics students depending upon their sex, age, social order(caste), and economic condition, distance of school and their home and also depending upon their intelligent capacity in each school. And one mathematics teacher was included in this research from each sample school because there is only one mathematics teacher who teaches mathematics at grade XI. Researcher actual aim was to do deep study of faced problems and their related causes

of Derivatives unit at grade XI. The schools, students and teachers are shown in the next following diagram:

Table 4.1: Sample Schools, Students and Teachers

Shree Janta Higher Secondary School, Bardibas Mahottari				
S.N.	Students 'name	Students' Address	Mathematics Teachers' Name	Teachers' Adress
1	Dipak Kumar Mahato	Bardibas VDC-9 Mahottari	Dhan Bahadur Parki	Mahottari
2	Binod Kumar Shah	Bardibas VDC-2 mahottari		
3	Sita Singh	Gaushala VDC-4 Mahottari		
4	Kiran Kumari	Bardibas VDC-4 Mahottari		
5	Manjee Das	Bardibas		
Shree Pashupatinath Highter Secondary School Bardibas Mahittari				
S.N.	Students' Name	Students' Adress	Mathematics Teachers' Name	Teachers' Adress
1	Aman Kushwaha	Bangha VDC-4 Mahottari	Ashok Singh	Dhanusha
2	Durga Rai	Bangha VDC -8 Mahottari		
3	Ram Krishna Karki	Mithila VDC-2 Dhanusha		
4	Anil Singh	Bangha VDC-8 Mahottari		
5	Giree raj Giri	Bangha VDC-5 Mahottari		

Tools for Data Collection

Being a qualitative research, there can be used many types of tools to get first hand information during the research. Mainly, there were two instruments of data collection in qualitative research.

-Observation guideline:.....

-Interview guideline:.....

The data from observation consists of detailed descriptions of classroom activities from first to last were categorized on the observed form. Researcher has adopted open -ended interviews with teachers and students of these schools to get the data for the research study. The data from interviews consisted of direct questions to the respondents about their experiences, opinions, feelings and knowledge.

In the context of establishment of reliability and validity, observation form of this research fully based on the M.Ed. peer observation form by the help of supervisor and interview formats based on this observation form and according to the taken objectives.

Data Collection Procedure

Case study is an empirical inquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and the context are not evident. As mentioned earlier; the classroom observation was undertaken upon those schools' teachers and students. The researcher went to each sample schools with tools to collect the primary data .Researcher observed the classroom regularly until 10 days while teacher was teaching unit "Derivatives " In this periods researcher observed carefully and noted each and every notable activity of teachers and students. For the research study, all the required information was not possible to gather through the observation alone. To clarify the information or to go in-depth interviews for dept information are more helpful. so, the researcher here carried out observation as well as open -ended -interviews to clear his query regarding the study and last his conducted focus group discussion about those faced problems and their related causes with all mathematics students and teacher of sample schools.

Data Analysis Procedure

To identify the problems which were faced by teachers and students during teaching/learning Derivatives, all information was collected from primary sources. To analyze the gathered data, the researcher used explanatory case study as the design of the study .

The faced problems and their related causes on teaching /learning topic Derivatives of grade XI were analyzed and interpreted on the basis of Ausubel's meaningful verbal teaching / learning model which researcher had already described. Faced problems on teaching/learning Derivatives were categorized into five points which were;

-) Problems related to learning environment of the sampled school.
-) Problems related to pre- concept of students for learning Derivatives.
-) Problems related to instructions in the classroom.
-) Problems related to teachers and students characteristics.

Problems related to teaching methods, materials and evaluation technique promoted by teacher for teaching Derivatives.

They were categorized by the themes of observation form and problems found from interview formats.

Chapter V

ANALYSIS AND INTERPRETATION OF DATA

In this chapter, I have depicted the information related to finding. What problems are faced by students while learning derivatives in the culturally diverse classroom?' This information was collected through interview schedule, informal communication, carrying out the students during field visits. I have interviewed with students and got different views how the students have faced problems. The field data are linked with different theories and literatures to analyze and interpret.

Problems Encountered by Students in Derivatives

Let me begin this chapter with a common notion that learning mathematics is not difficult in a true sense, but it is made more difficult. Nepali proverb, "Whether or not the tiger in the jungle eats up, the tiger in the heart really eats up" (My translation from Nepali: Banko baghle khawos ki nakhawos, manko baghle khanchha). Socially students are treated as mathematics is a hard subject and only a few people can learn it. In fact, due to the lack of practical knowledge of mathematics in school, students commonly become less interested in studying mathematics. A key believes that prior to successful level of students engagement in mathematics positively influences academic performance in mathematics in latter year (Brown, 2007).

On the contrary, the existing practice of teaching and learning mathematics in schools is not much more interesting and successful from the point of view of students' learning. To improve teaching and learning process in learning mathematics classroom requires a better understanding of the real nature of common difficulties that hinder conceptual learning, particularly at primary level, as well as the pedagogical remedies by the teachers, to help the students overcome these difficulties. There is an obviously lack of the contextualizing and understanding of the challenges our students and

teachers everyday faced challenges in mathematics classroom and possibilities of improving mathematical learning that exist in Nepali schools. Therefore, in this chapter I have dealt with the second research question. In order to obtain the answer of the second research question and achieve the aim of the research, I collected data from my participant: students.

Teachers and students feel difficulties in the teaching learning of mathematics in the culturally diverse classroom. This is because students are from different cultural backgrounds and philosophy and the culture of teachers and students do not match with those of students. The cultural artifacts and mentifacts of the students have not been recognized, and thus students have to go under hardship in recognizing and get acquainted Eurocentric mathematics which is out of cultural bounds of teachers and students. The theme of my inquiry might have included such topics - acculturation, learning cognitive domain, inequality or child and adult development. I began the study examining respondents on interaction, on natural setting and by attempting to discern pervasive patterns such as life cycle, events, and cultural themes.

Mathematical anxiety is a personal factor that influences the meaningful learning . resulting not so good in reasoning. At this situation learning becomes for the sake of learning. Culturally different children have problem of not understanding the underlying meaning of questions because of less language proficiency. Though the children are generally taught to use formulas and solve the problems. At this context, I have made some key understanding of problems faced by students in multicultural classroom situation in learning mathematics. These aspects, I have discussed in the following sub-sections.

Communication Problems

In most cases, the communication occurs verbally in multicultural mathematics classrooms. Thus the language used by the teacher and the languages spoken by the students from diverse caste/ethnic backgrounds are keys to take into consideration while discussing the communication as a problem. As faced by the teachers the dilemma of linguistic communication, the students were also encountering the same problems in learning activities in mathematics. In this regard, when I asked to a student, "Do you feel difficulties in learning Derivatives because of language used by teacher?". In response, the student expresses her feeling,

"Since Maithili language is my mother tongue, I feel Maithili language is easier than English and Nepali. When I read textbook I preferably give more priority to read Mathithili language but the textbook is not written in Maithili language. Then I give priority to read in Nepali.

This conversation provides me an insight that the language other than mother tongue has created a challenge to the students who are from culturally different community. The Nepali language used as a medium of instruction may have a barrier to understand the mathematics learning to non- Nepali speaking students. It seems to me that English may have become more difficult to those students in learning mathematics. However, the above result shows that it has become a prime barrier in learning mathematics. In this regard, Gay (2000) and Ladson-Billings (1994) showed that the academic achievement of students who come from culturally and linguistically diverse backgrounds improve if schools and teachers ensure that classroom instruction is conducted in a manner that is relevant to their home and community cultures.

Misconception on Mathematics

It was believed that mathematics was, for a long time, regarded as neutral and culturally free, and also considered free of social values (D'Ambrosio, 1990). It was always taught in schools as a culturally neutral or free subject that involved learning supposedly universally accepted facts, concepts, and contents. In other words, Western or academic mathematics consists of a body of knowledge of facts, algorithms, axioms, and theorems. I think mathematics is directly connected with culture and society. Mathematics develops from socially accepted concept. Mathematics is considered as a cultural creation. Mathematics plays a vital role in the advancement of culture and civilization. So, development of culture mathematics enhance each other. Furthermore, it also helps people in transmitting and enriching the culture. Nepalese mathematical education community tends to consider mathematics as culture free subject. This shows orthodoxy prevalence in the academic circles. But ethno mathematics is different because it is the study of a cultural group's mathematics (D' Ambrosio, 1984). In this issue I asked my teacher participant and she opines,

"Many people believe that mathematics is culture free subject and it should be taught in the same pattern I think mathematics is directly related with culture and society. Mathematics develops form socially accepted concept".

Mathematics has strong association with culture of a particular context. In this regards, Bishop (1990) notes that a principal assumption is that of cultural consonance; that is, learners are not expected to experience any conflict with, mathematics-technological, society and its associated culture. He claims that this is because of a general lack of understanding of mathematics as cultural knowledge, and a lack of awareness of any values understanding mathematical knowledge. For many people

still, mathematics is culture free and value free knowledge yet, and understanding mathematics is culturally- based knowledge.

Less Motivational

Motivation direct, controls and clarifies the human behavior. Some students seem naturally enthusiastic about learning, but many need or expect their teachers to inspire, challenge, and stimulate them: "Effective learning in the classroom depends on the teacher's ability to maintain the interest that brought students to the course in the first place" (Erickson, 1978). In regard to motivation, my participant thinks,

"I do not have any fixed daily plan for motivation , sometime I asked formula, explain the important points why this is to learn, providing some reward also rather than criticizing the unwanted behavior or answer, reward correct behavior and answers. They did not plan any fixed rule for providing the motivation, they motivated their students randomly. "

Since motivation factors for students are crucial to their learning, teachers should channel students' attitudes and interests in subjects, conducive to learning. Teachers need to support and enhance students' motivational orientation how they feel about a subject and their confidences to do well in a subject and beliefs that what they learn is worth learning. Teachers need to make students understand the purpose of the lesson and value what they learnt. The teachers' main task is to motivate students to become involved in the learning activity. In other words, instruction aims to enhance the interest first and then to develop the skills. Social constructivist teachers create a classroom culture to support the students' intrinsic motivation. They provide ample opportunities for social interaction and self; expression.

They also make their students develop a sense of their active roles as producers

not only consumers of knowledge. Interviews with the students show that they motivated hardly towards learning mathematics in the classroom because of various factors of cultural imbalance between and teachers and students. On the other hand, teachers also did not show any painstaking activities in order to motivate such students towards learning mathematics. Upadhyay (2008) claims that every mathematical object that has come to existence is motivated by the spirit of game.

Prior Knowledge of Students

Lack of acknowledging the students' prior knowledge is another problem. The prior knowledge of students may play a vital role to conceptualize the mathematical concepts. The basic knowledge of mathematics in lower level is also determined by students' performance in the further study. Mathematical pre-knowledge helps for all round development of students in the mathematics. Those students who have lack of sufficient prior knowledge do not want to learn and cannot get success in the further. In the line of this discussion, the following views of students are worthwhile to present here;

The above view of student's emphasize students have not sufficient previously learned mathematical knowledge. The students cannot assimilate of relating new mathematical concept and principle to previously learned mathematical structure. The mathematics teacher asked to the students about the pre- knowledge of this topic but every student was silent and nobody answered this question and although they have shyness and not to be frank with teacher and students they seems like they are afraid with teacher and if I answered somebody will laugh and hesitated me after finished the class Arjun said me who is the one participant of this research. Lawati said: I had main problem to learn

mathematics. Mathematics course were not finished in time. Also I know about use of mathematics. So I actually not like to learn mathematics when I face to problem of mathematics it is began to headache.

According the text data, most of the students promoted in the subject of mathematics at upper level without well forming the mathematical concepts in the lower grades. This is because they were unable to perform well in mathematics in upper grades. Similarly, in the lower classes, mathematics curricula were not included the sufficient basic concept of mathematics. Students feel mathematics is new one and difficult subject. It is not related to the students' behavioral life and it is not relevant with the locality.

The aforementioned views of students, mathematics teachers indicated that prior knowledge of mathematics is important for the betterment of students. The head teacher said that students were promoted unnecessarily without knowing the concepts of mathematical knowledge in the lower level and mathematics teachers said that students have no sufficient basic knowledge in mathematics in this time that's the reason students did not pass in mathematics. These all responses indicated that the students cannot be able to assimilate or relating new mathematical concept and principal to previously learned mathematical structure.

In this regard, Albert Bandura's social learning theory emphasizes the importance of observing and modeling the behaviors, attitudes, and emotional reactions of others. Bandura (1977) states: "Learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do. Fortunately, most human behavior is learned observationally through modeling: from observing others one forms an idea of how new behaviors are

performed, and on later occasions this coded information serves as a guide for action." (p. 22). Social learning theory explains human behavior in terms of continuous reciprocal interaction between cognitive, behavioral, and environmental influences.

Because it encompasses attention, memory and motivation, social learning theory spans both cognitive and behavioral frameworks. Bandura's theory improves upon the strictly behavioral interpretation of modeling provided by Miller and Dollard (1941). Scope/Application: social learning theory has been applied extensively to the understanding of aggression (Bandura, 1977) and psychological disorders, particularly in the context of behavior modification (Bandura, 1969). In recent years, Bandura has focused his work on the concept of self-efficacy in a variety of contexts (e.g., Bandura, 1993). Example: The most common (and pervasive) examples of social learning situations are television commercials. Commercials suggest that drinking a certain beverage or using a particular hair shampoo will make us popular and win the admiration of attractive people. Depending upon the component processes involved (such as attention or motivation), we may model the behavior shown in the commercial and buy the product being advertised. Hence, the role of prior knowledge of mathematics is a very important aspect for students' successes in mathematics.

Challenges Encountered by Teachers

In this chapter, I have articulated the information related to finding the answer of the third research question; 'What challenges are faced by teachers while teaching mathematics in the culturally diversified classroom?' This information was collected through interview schedule, informal communication, carrying out the teachers during field visits. I have interviewed with teachers and got different views how the teachers have faced challenges. The field data are linked with different theories and literatures to analyze and interpret.

Problem faced by Teacher in Teaching Mathematics

Lack of associating the mathematics teaching with real life situation has been a serious problem in many countries in the world. This practice has limited to the students and teachers to adopt algorithmic problem solving approaches without reasoning of mathematical concepts. As perceived by my teacher participants and triangulating with the observational information and visiting and revisiting the transcribed data, I came to realize the following key themes that were problems encountered by teachers in culturally diverse classroom.

Communication Problems

As the communication is the exchange of ideas based on language. Without meaningful communication, no effective delivery of content is possible in the classroom situation. In most of the cases in Nepal, the teachers speak mainstreaming language mostly Nepali. This has created injustice to the non-Nepali speaking children. Therefore, linguistic communication between teachers and students was a key dilemma in teaching learning mathematics in multicultural classrooms. In this regard, one of the teachers opines,

"Mostly I teach in Nepali language. But there are multilingual students in the classrooms. I feel that some students who come from Nepali speaking family can understand the subject matter easily. But some from other than Nepali language cannot understand in the same speed. They ask me questions many times. Sometimes, they feel embarrassed to ask questions in Nepali language. Therefore, I attempt to simplify my language so that they can easily understand in the classrooms. "

From the above data, I realized that language was a major barrier faced by the teachers as a medium of instruction in the multicultural classroom situation. The

teachers were not competent in multi-languages as spoken by the students as their mother tongues. Therefore, it seems to me that the multilingual education practices as envisaged by the government were ineffective in this case. Moreover, there is diversity among the students in the classroom in terms of language they speak. The schools with a total domination of single language instructional medium seems a barrier to learning mathematics. The mother tongue based education was lacking (CHIRAJ, 2001). For me, a teacher's role, therefore, is to organize learning for all children to help them learn to the maximum according to their capacity (CERID, 2008).

De/contextualization Teaching

The problem of culturally decontextualised mathematics education faced by Nepali students, teachers and teacher educators has often been oriented by the view of the nature of mathematics as a body of pure knowledge, which gives rise to an exclusive emphasis on an ideology of singularity, epistemology of objectivism, language of universality and logic of certainty whilst developing curriculum, conceiving pedagogies and implementing assessment strategies in school mathematics education and mathematics teacher education programmes.

As I observed the classroom situation or the students' context of teaching learning activities, the teachers were found mismatched in their delivery process. As my observation,

When I entered into the grade V of Nepal Rastriya Higher Secondary School, Nepaltar, I observed that the teacher was teaching geometry and he gave same example of drawing a triangle on the board. He did not attempt to make students understand the feature of triangles giving more other examples which the students saw around their context.

In this regard, one of the teachers expresses his experiences of teaching

mathematics in primary classrooms as,

"Generally, I teach the students what is there in the book I haven't taught many other curriculum irrelevant matters in the classrooms. I let them do the exercise whatever given in the book. "

These data reveal that the existing pedagogical practices in the public schools of Nepal were largely focused on text- books rather than contextual situation. In other words, the content of mathematics was not associated or embedded with their culture and cultural practices. Moreover, it has been guided by the notion of absolutistic philosophies of mathematical knowledge consisting of certain unchangeable truth and the unique area of certain knowledge with certain algorithms rather than fallibilistic philosophy. Therefore, I have viewed that this phenomena is a major challenge in teaching mathematics in the classrooms.

Lack of Training

As understood by me in the field work, the most of the teachers have been trained generally. However, they were largely untrained on how to teach in the multicultural classroom situation. They were unaware of pedagogical practices in diverse cultural classroom setting. They have been adopting one size fit all principle. During the interview one of the participants said,

"I have taken many training provided by the government. But no trainings have been taken on how to teach in the classrooms of diverse ethnic or culture groups. Therefore, I don't know about this. "

The version of the teacher was absolutely justified with his teaching activities in mathematics class which was observed by me during my class observation. Thus the teachers of public schools were not trained in teaching in multicultural classrooms, through the government claimed that there were about ten thousand teachers who were

already trained multicultural perspectives. However, these teachers were lack adequate training on the multilingual education and multicultural classrooms. Therefore, it seems to me that these teachers need more relevant trainings and implementation and strategies in Nepalese context.

Overload

Teachers in public schools have got six or seven periods per day. It created a challenge to give individual feedback, individual support, and thus made individual guidance difficult. It has been difficult to provide time to the individual students. As per my field experiences, I feel that the public school teachers are over-loaded in teaching activities engaging about five to six hours in a day. This is complemented /substantiated by my participants' voice as;

"Actually, uploading the knowledge of mathematics to acquire, the role of school is indispensable. Financially, school should cooperate the teachers to make availability of teaching materials, library and internet facilities. At least, school should help in reducing the number of periods of teacher so as to allow him to spend his extra time in planning and assessing students. Also, the number of students in the class should be reduced to controllable size so as to allow group work".

The data presented above depicts that the teachers are willing to reduce their working hours so as to allocate their time in planning and assessing the students. Morning through evening teachers is overloaded with number of periods. A teacher needs to teach 5 to 6 periods per day and as such they cannot manage their time in planning the future course and assessing the students. The students in the class over-crowded and as such teacher cannot give individual care in the class, nor do counseling out of school time.

Irrelevant Pedagogies

The teachers in Nepali mathematics classrooms have been adopting traditional teaching learning activities. In other words, their teaching approach is one size fit for all. They focus more on memorization and application of already established formulas. It is the teacher who can influence the attitudes to mathematics of his pupils. The main concern of quality teaching- learning is the suitable pedagogy for successful learning of mathematics. Most of the teachers believe that one size teaching approach fit for all. In this regard, one of the teacher says,

"I generally use memorizing, drill and question-answer methods for mathematics teaching. I always think about my students and try to get new ideas for better teaching and learning. I think my methods are productive for students for learning mathematics. I ask question and sometime I let the students to do the problem on the white board. I understand the position of my students' learning from the given task. There area lot of weaknesses in teaching learning process in mathematics. The teacher asks students to memorize the formula and remember them. Also they ask the students to use formula while they are working on the problems. "

Regarding the teacher's view, I have come to realize that students are forced to memorize the mathematical concepts without practical knowledge. Productive learning is rooted on the appropriate pedagogy used by teachers. But there are lots of drawbacks in the teaching mathematics in the observed classrooms. Classroom mathematical discourse plays a central role in shaping mathematical capability and disposition (Ball, 2001). likewise in this perspective, Ladson-Billings (1994) states that culturally relevant pedagogy is an educational approach that empowers students intellectually, socially, emotionally, and politically through the use of cultural and historical references to convey knowledge, impart academic skills, and change students' attitudes towards academic instruction. Likewise, good games can also avoid the difficulties of

learning mathematics. As Upadhyay (2008) expresses his views for the games and says that "playing a good game or puzzle is the closest thing to doing mathematics, it stimulates essentially the same abilities and often requires the same types of strategies and also increase creativity as mathematics

Chapter VI

FINDINGS, CONCLUSIONS AND IMPLICATIONS

As stated earlier, the purpose of the study was to identify the problems faced by the mathematics teachers and students in teaching/learning Derivatives and causes of problems. For this purpose researcher selected only two schools of Mahottari district. The tools in the data collection procedure are class observation form, interview formats for both the teachers and the students. The researcher selected five students and a teacher from each school. It means ten students and two teachers. The statements of problem of this study is problem faced by mathematics .Teachers and students in teaching/ learning of Derivatives at grade XI and the main objectives of this study were. To investigate different types of problems during teaching/learning Derivatives and to find out their causes in teaching/learning Derivatives .s

Design of this research study was expository case study of both sampled schools. To support the findings of this study researcher uses the meaningful learning of Ausubel which is called expository model. Methodology of the study was class observation and interviews as well as focus group discussion were chosen as the tools for the study since the study was qualitative.

Findings

On the basis of the data analysis and interpretation of the result, the summaries of major finding are as follows.

Problems related to learning environment of the sampled school

-) Both of schools haven not adequate mathematical materials for Derivatives teaching /learning although there are sufficient physical facilities and also lack of protection of available materials for further uses.

The cause of becoming problems are lack of ideas to generate locally available

materials in teachers as well as schools for teaching derivatives and not available separate place to store materials.

Problems related to pre-concept of students for learning Derivatives

-) Students do not have necessary pre- concept related to derivatives like functions ,Co-ordinate Geometry, Trigonometry, Equations &Graphs and so on. So, most of the students leave the Derivatives questions in examination. Some students have faced problem in geometry figures. Hence they study just exam-oriented point of view.

The main causes are lack of practice for learned topics and lack of understanding basic concept.

Problems related to instructions in the classroom

-) Teacher presented good examples of Derivatives but he didn't know how to give clear concept about it. Teachers ownself solves the problems during class time when students confuse. Then it cannot make the students active and participate to the meaningful understanding.

Furthermore, different problems have seen during the classroom activities due to;

-) Students attempt class irregularly.
-) Students have poor pre- knowledge on the related field.
-) Students do not do assignments daily and teacher also not checking daily.
-) Lack of pedagogical knowledge to the teachers about clear concept of Derivatives.
-) Lack of mastery teaching in Derivatives.

The causes of becoming the above problems are lack of motivation in the class, lack of practical knowledge about Derivatives, lack of using locally available teaching

materials. Teacher behavior is not so friendly; sometimes he abuse to students. Teachers are unable to provide well concept of Derivatives to students, subject matters of Derivatives are change in the curriculum of grade XI (specialization mathematics), lack of quality of questions and enough examples in textbook. Teachers haven't well knowledge about construct and use of locally available materials. For that, teachers are required to participate in training, seminar and conferences.

Problems related to teachers and students characteristics.

-) Teachers are not well trained. He has knowledge on his subjects matter but the problem exists in the teaching technique, courses are not complete on time.

The causes of problems are due to lack of teacher training, pedagogical knowledge; schools remain closed due to governmental policy and the strike of students on different issues and teachers personal matter.

Problems related to teaching methods, materials and evaluation technique promoted by teacher for teaching Derivatives

-) Teachers are not using mathematics teaching manuals, extra reference books beside the textbook prescribes depend upon HSEB curriculum for effective teaching.

The causes of above problems are teaching manual of mathematics of grade XI is not published by HSEB yet. Also there is a lack of motivation and encouragement to students .

-) The problems on Derivatives teaching/learning materials such as teachers guide (teaching manual) and instructional materials, lack of knowledge to construct low cost materials and handle school's property. Lack of learning management in classroom, lack of explanation of terms such as Derivatives,

procedure of finding Derivatives etc. Low priority for giving feedback and suggestion to improve Derivatives learning.

The causes of becoming problems are not well participatory approach of both students and teacher in Derivatives teaching at classroom. The causes of above problems are lack of knowledge how to do correct use of expository model for teaching. Teachers evaluated the students by giving class work and homework but he did not check them regularly, do not provide appropriate feedback and suggestion to improve learning Derivatives.

Conclusions

The research was case study about problems faced by Mathematics teachers and students on Derivatives at grade XI. The design of the research was qualitative

Since the research was conducted over mathematics teachers and students at grade XI of Mahottari district. It was found that the problems becoming in Derivatives teaching /learning are;

Problems related to learning environment of the sample school. Problems related to pre- concept of students for learning Derivatives . Problems related to instructions in the classroom. Problems related to teachers' and students' characteristics. Problems related to teaching methods ,materials and evaluation technique promoted by teacher for teaching Derivatives. The above problems are becoming on teaching /learning Derivatives due to students ' weak pre- knowledge about Derivatives and poor geometrical background. Teachers are unable to access modern teaching techniques and materials at teaching Derivatives. Derivatives learning seems to be exam- oriented rather than practical and to develop skills, concepts and principles oriented. Teachers are unable to present the subject matter by effective way due to lack of participating on seminar, meeting, teacher training etc. and also lack of child psychology. most of

students have less interest towards Derivatives learning. Derivatives being an abstract subjects matter and also, it is a new concept at grade XI, so it is difficult to create interest on students. Teachers and students faced problems teaching/learning Derivatives due to poor evaluation system, careless of schools' administration and non-effective learning management.

Teacher should motive the students and relate the new concepts with pre-knowledge of the students so that students will be positive in the concepts and ready to learn. Teaching should be done according to the need and interest of students in meaningful way. Hence the students 'pre-knowledge plays a most important role to mastery in learning Derivatives.

The teacher should determine the steps that are to be in sequential structure, where teacher should describe each step meaningfully and appropriately, otherwise students cannot learn in meaningfully way. Description of each step of learning is possible only in good expository method as that it is applicable in meaningful learning and weak students can learn easily. Teaching materials should be meaningful to the learner. To ensure meaningful learning, the teacher must help students to build linkages between their own cognitive structures of the discipline being taught. Mathematics teaching should be done by using teaching materials related to subject matter to make teaching effective, permanent and meaningful. It is possible only by expository method and not by discovery method.

Expository method should be used in teaching new concepts in mathematics. If other method, such as discovery method is used, they create confusion to the students as well as consume much time in concept development. Expository method helps the students to understand the solution of the problems in a meaningful way.

It is helpful to researchers for further research on teaching/learning Derivatives.

Most of students know how to solve the questions of Derivatives but they don't know about actual concept of Derivatives so, it helps to all students as well as teachers to understand mathematical skills, facts and principles of Derivatives

Implications

My research will be significant to promote by learning in Derivatives mathematics Classroom as well as other aspects of Science Classroom of Secondary Level Students. This Chapter will help to Velocity and speed of change of rate measurement. It is helpful to the Comparative study of problems faced by Teachers and Students on teaching/learning in Secondary Schools. It is implicable for teacher to teach mathematics meaningful. In addition with this the research will be implied in different aspects.

Policy Policy implications refer to imply research findings and recommendations in policy making and implementing process. My research will be helpful for policy maker in the following ways;

-) To develop our Mathematics education in Secondary level.
-) To help the subject makers for researching Field.
-) To help the teaching learning theory use for Secondary level.
-) To show the Gravitational force attach the objects in dropping.

Pedagogical Pedagogical implications concern with the methods and strategies of teaching and learning mathematics. Specially, for school level teacher my research will be useful in following ways;

-) To apply various techniques and strategies in mathematics teaching/learning Derivatives in secondary level Students.
-) To promote the research areas for students.
-) To develop imagining, thinking, understanding and discovering power of students.

Implication for myself for professional development. To become responsive ,co-operative, reflective and transformative teacher this study will be significant for me that will contribute me for professional development. In addition to this my study will be helpful for me in following ways;

-) To be better mathematics teacher with positive thinking.
-) To be more thinking, imaginative and discovering power.
-) To searching and finding the speed change to the Transports.
-) To do for further research this inquiry will guide me more supportively.

Thus, my research will be helpful for thinking, imagining and searching mathematical knowledge for active participation of each students and mathematics teacher in Derivatives learning in secondary level.

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Appendix-A

Classroom Observation Guideline

School's Name:..... **Address:**.....

Student's Name:.....**Class:**.....

The researcher will ask the questions in secondary level students of derivatives topics.

Classroom Management and Environment

- Classroom structure and structure
- Seat planning of students
- Cleanliness
- Space for teaching materials

Student's activities in Classroom

- Greeting to teachers
- Following direction of teachers
- Medium or language of conversation
- Completion of class work and home assignment
- Participation in Classroom discussion
- Misbehavior with students and teachers
- Conversation with teachers
- Unnecessary talks among students
- Students co-operation
- Sharing problems in classrooms with students
- Sharing problems in classrooms with teachers
- Interaction between teachers and students
- Regularity and punctuality

Teacher's activities in Classroom

- Classroom Entrance
- Revision of course
- Language
- Motivation
- Use of re-enforcement
- Use of instructional materials
- Encouragement to students
- Classroom pedagogy
- Interaction with students
- Homework
- Class work
- Providing help for weak students

Appendix-B

Interview Guideline for students

School's Name:.....

Address:.....

Student's Name:.....Class:.....

The researcher will ask the questions to secondary level students of derivatives topics.

Classroom management

- Is your classroom neat and tidy?
- Is seat planning is well managed?
- Is there sufficient furniture?
- Do you think the position of white board is correct?
- Is your classroom noisy while teachers are teaching?
- Do your teacher use teaching materials?
- Do you get disturb by your friends?
- Is there any kinds of bullying in your classroom?

Student's activities in classroom

- Do you greet while your teacher enters the class?
- Do you follow teacher's instruction in class?
- Do you brings all your required materials (i.e. books, notebooks, pens ect) regularly?
- Do you complete your classwork in time?
- Do you feel difficult to understand English and Nepali language?
- Do you submit your home task regularly?
- Do you feel difficult to talk with your teachers?
- Do you participate in extracurricular activities?

- Do you get equal opportunity in participation in classroom discussion?
- Do you hesitate to share problems in classroom?
- Are all your friends friendly?

Teacher's activities and school administration

- Does your teacher give assignment regularly?
- Does your teacher check your assignment regularly?
- Do you feel that your teacher's behavior towards you is different than others?
- Does your teacher discriminate you?
- Does your teacher ask questions frequently?
- Does your teacher motivate you for practicing mathematics problems?
- Does your teachers describe the problems individually?
- Do you feel difficulty in language used by your teacher?

Socio-economic problems

- Do you get sufficient time for doing your homework?
- Do your parents help you in solving you mathematical problems?
- Does your parents provide you sufficient teaching materials?
- Does your parents provide you extra classes in home?

Appendix-C

Interview Guideline for Teachers

School's

Name:.....Address:.....

Teacher's

Name:.....Class:.....

The researcher will ask an interview with teachers to gather information under the following mentioned topics.

Classroom management

- Is your mathematics classroom neat and clean?
- Is seat planning is well managed?
- Do you use appropriate teaching materials while teaching?
- Is your classroom noisy while running class?
- Do your students talk unnecessary things while you are teaching?
- Do your students disturb you by asking unnecessary questions?

Student's activities in classroom

- Does your students greet while you enter the class?
- Do the students follow your instructions in class?
- Do they bring all necessary documents (i.e. books, copies, pens etc.) regularly?
- Do your students complete their class work and homework on time?
- Do they feel difficult to understand English language?
- Do they participate in extracurricular activities?

Teacher's activities and school administration

- Do you give home work daily?
- Do you check their class work and homework on time?
- Do you feel difficult to make than understand in English language?
- Do you make them participate in extracurricular activities?
- Do you use teaching materials while teaching?
- Do you ask questions frequently?
- Do you motivate for practicing mathematics problems?
- Do you describe the problems individually to the students?
- Does your school administration provide teaching materials to you?

Socio-economic problems

- Do you think that your students get sufficient time for doing their homework?
- Do you manage teaching materials from the community?
- Do you think that it will be easier to you to teach if parents provide students extra classes in home?