RESEARCH ARTICLE

Problems faced by secondary education students in solving derivatives

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Abstract

The main goal of this research is to find out the causes of the problems that mathematics teachers and students face in teaching/learning derivatives in the third intermediate grade. The study design was qualitative. The study was conducted on mathematics students in two middle schools in Najaf Governorate, and a mathematics teacher from each school was selected from the study sample. The data collection tool uses classroom observations and open-ended observations in the form of interviews for teachers and students. That is, the research methods are classroom observations and personal interviews, respectively.

Results show problems with teaching/learning derivatives Relevant to the learning environment of the example school; as is prior knowledge. Classroom operating instructions; teacher and student characteristics; and teaching methods, teaching materials, and Assessment techniques.

The above problems are all caused by students; prior knowledge of this is weak Students lack unique cognitive structures such as functions, geometry, and coordinates.

The project is valid. Teachers do not have access to materials and information on modern teaching techniques

Teaching is evaluated for lack of ideas for generating locally usable material.

Keywords: learning difficulty - student problems - derivatives - mathematics teacher

Chapter-I

Introduction

Background of the Study

Mathematics has been crucial to the development of civilizations from ancient times to the present day modern. Mathematics is a widely studied social product usefulness.

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Mathematics grew out of the needs of organized human society. so that Mathematics is created by the human mind and therefore the main concern is Contains ideas, processes and considerations that are central to our daily lives. question. Everyone's mathematical picture is different. some people like it Some people don't do it, some try to use it, and some avoid it.

The word "mathematics" has different meanings and explanations

The numerical and computational part of human life and knowledge. it is also defined as Science in abstract form

.Math teachers face challenge of defining what can be Take into account the minimum math skills expected for the semester "Mathematics" has been interpreted and explained in many ways. Therefore Oxford Dictionary; "Mathematics is the science of numbers and space." 20th Century Quote For centuries, mathematician Albert Einstein defined: "Mathematics is a free invention." human intelligence" (Upadhyay, 2004). This is where the word "mathematics" comes from.

Interpreted and explained in different ways. It's quantity and knowledge. Too Science defined as abstract form. Mathematics teachers are faced with the challenge of defining something. what could be Considered minimum expected math ability An enlightened citizen of today's society. However, I couldn't find one General consensus on such things. This remains the responsibility of professionals Organize math teachers to make suggestions they may find useful Such a statement about the capabilities of society as a whole today;

But this requires a lot of complex mathematics Function.

Theoretical society's highly complex problems require complex problems

Mathematics to solve them. Most mathematical structures, rules, formulas, etc. It is the result of ancient empirical observation and experience. But Now empirical mathematics has developed into an abstract mathematical theory, without Mathematical knowledge makes it difficult to understand each other better Chemistry, physics, social sciences, economics, psychology, engineering and other disciplines

etc. It is interpreted as a mathematical model rather than mathematics

Knowledge; understanding these subjects is very difficult. That's what mathematics is Intimately involved in every moment of every human life and in every human discipline civilization. Upadhyay (2004) writes that the First

International Congress The first milestone was the mathematics training in Lyon, France, in August 1969 Establishing mathematics teaching as an independent subject. The 5th International.

The Conference on Mathematics Education (ICME-V) recognizes the importance of mathematics education Teaching mathematics through conference plenary lectures. Actually,

Mathematics pedagogy is the study of aspects of teaching mathematics. in context In Nepal, mathematics education has been around since ancient times There is no rigorous curriculum and no clear goals. But at this time mathematics has Be accepted as an integral part of the education system. Since the Vedic period The "Gurukul" period was the education system of the Vedic era. In the "Gurukul" system the Vedic name "Ganita" of mathematics includes Astronomy and Art. But there are problems with the mathematics curriculum The teachers, teaching materials and teaching methods at that time. Officially Mathematics is listed as a subject at every level Established Darbar High School in 1910 Ashwin was 27 years old. During the Rana regime.

The National Education System Plan (NESP) was in effect from 1971 to 1976. This educational program led to very significant changes in mathematics education National NESP. This clearly expresses the importance of teaching mathematics "Mathematics, like language, is a fundamental means of communication.

Mathematical concepts are used frequently. Therefore, it is natural that mathematics should do occupies a very important position in school education along with language (Sharma, Chapter 2066)

Learning can be defined as change in behavior through experience

educate. It's about changing your own behavior permanently. learning needs From cradle to grave, equip learners with problem-solving skills

Solve everyday problems to fit into his/her life. Learning mathematical derivatives is a trend.

A logical arrangement of sets and many related concepts. Derivatives are

Basic symbols of calculus. Derivatives are one of the important concepts in finance Calculus as it is used to build other mathematical ideas. Bezuy Denhout (2001).Point out that students are largely unable to express meaningful ideas in calculus Because the psychological connection between "derivatives" knowledge and "derivatives" knowledge is insufficient and weak.

Learn about other calculus concepts such as "limits," continuity, and integrals.

The concept of definite integral. The derivatives process is critical to calculating interest rates The area under the curve changes. Calculus is one of the most useful and important forms of mathematics

Branches of Algebra and Geometry. This is a study of the word "rate of change" "Calculus" originally meant a small reservoir or pebble. dy/dx' d'y/dx notation The derivative was defined by the 19th century French mathematician Auguste Louise Cauchy (Basic Mathematics Lesson 9), later formalized and logically stated rigorous in the 19th century by the German mathematician Karl Weierstrass. 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.

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 problems, 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:

☐ Identify the problems faced during teaching and learning derivatives in the third intermediate grade In mathematics class.

☐ Identify the causes of problems facing teaching and learning

Derivatives in the third intermediate grade 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

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.

2-Chapter

Theoretical literature

1-REVIEW OF RELATED LITERATURE

1-Empirical literatures

1-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.

2- 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.

3-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.

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.

2-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.

3-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 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.

Chapter-3

Methodology

This study is mainly qualitative type. Mainly, study design، Study population, site selection and study sample, data collection tools،

The data collection procedures and data analysis procedures are described as follows:

1-study design

It is qualitative research, so the design of this research is an illustrative case study Problems faced by teachers and students in teaching/learning derivatives of the third intermediate grade.

Case study research is empirical research that examines contemporary issues The phenomenon in its real context. It is an in-depth study of a specific person

I follow this method of study when learning mathematics derivatives.

Choosing the site and study sample Supervision of Najaf schools.

Middle school teaching mathematics in the third year of middle school. So The researcher chose these two middle schools as a sample for his research.

In fact, the researcher selected only five mathematics students based on this Their gender, age, social system (class), economic status and after school Depending on their smart abilities in each school.

A mathematics teacher was included in this research from each sample school because There is only one mathematics teacher teaching third grade mathematics. The actual aim of the researcher was to conduct an in-depth study of the problems faced and the causes associated with them

2-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.

3-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 were⁹

☐ 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 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).

5-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 Or thodoxy 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 .

6-Problems Encountered by Students in Derivatives

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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 .

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.

Conclusions

The research was a case study of the problems faced by mathematics teachers and Derivatives students in the third intermediate year. The research design was qualitative Since the research was conducted on mathematics teachers and students in Third grade in Najaf Governorate, supervision. It was found that the problems became in the derivatives

teaching/learning;

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.

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.

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