

REFLECTIONS ON READINESS OF FRESHMAN STUDENTS IN UNDERGRADUATE MATHEMATICS

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Abstract: In this study , we attempted to understand the problems associated with learning processes of function concept within freshman mathematics classroom. Before starting to teach Function Concept to the General Mathematics class of freshman students , we applied a diagnostic test with a single question. “Define the Function Concept and decide which of the following relations can be a function?”

Then we delivered the Function Concept to the class in a lecture mode of teaching and give various counter examples of relations which are a function or not a function. Then as a post -test we asked the same question to the same class to measure any gain of the function concept. Unfortunately, we did not get any satisfactory improvement in the formation of the Function Concept. The results are given in the paper.

Key words : General mathematics, Function, Concept teaching, Concept learning

INTRODUCTION

The aim of this study is to investigate the learning processes of the function concept in General Mathematics course at the University level. To identify student’s misconceptions and to find out the readiness of students in that course is very crucial. The General Mathematics course is the one of the most widely common subject of freshman students where misconceptions and errors occur.(Aydin,ICQH 2014) General Mathematics is a compulsory course at the freshman level in most of the Faculties such as Engineering, Commerce,Economics and Life Sciences. This course is not a core course for those Faculties.It is realized as a service course by them. The students of these Faculties are not willing to learn it rigorously and thoroughly in a meaningful way as a science subject. The high school graduates in that course are not homogeneous from the point of view of readiness level at mathematics knowledge to take this course. All the freshman students in that course entered to the University Entrance Examination which has Mathematics Test in it. Their success grades in Mathematics Test varies from very low to the very high point . The instructor of the course has to prepare and present his/her lecture for that heterogenuous class accordingly to the present students in the class who ranges from the bottom mathematics level to the high mathematics level.

Students who have conceptual misunderstanding of fundamental definitions of high school mathematics should be identified earlier to correct those misconceptions. Otherwise, they will give up to learn any mathematics any further. This will restrict their choice of future planning of prospective career.

The function concept takes place in the first year of secondary school curriculum. In General Mathematics of the first year of university , we start with preliminaries such as sets, plane, line equations, etc.. The first main topic of General Mathematics is the Function. The concept of the Function is a essential notion to learn the more advanced mathematics topics . If a high school graduate do not know the meaning of the Function concept , and no visual image of it, he/she can not learn General Mathematics at all in a meaningful sense.

METHOD:

The readiness of students in the mathematics knowledge before starting General Mathematics course at the freshman level is diagnosed . The first main subject of the General Mathematics course was the Function Unit . Before we started to teach the Function Concept Topic , as a short quiz question, we asked the following diagnostic question to the freshman class.

What is a function? Define it. Are the followings each statement a function ?

- a) $y=5$ b) $x=2$ c) $y^2=x$ d) $x^2 + y^2 = 9$ e) $4y - 3x = 8$
- f) To each student , there corresponds a school number
- g) To each parent, there corresponds an annual income

We graded the answers and found out that none of the students give the right answer to any of the above questions in the quiz.

The research design of this study can be named “ exploratory study “ where we tried to find out the readiness level and misconceptions of students during the realistic classroom setting. This research can be named a case study since we investigated a contemporary phenomenon in its real life context.

Then the Function Unit lectured to the class in a classical way of teaching in a conference mode by the instructor. Our definition of the Function Concept given in the class was as follows:

“A function f on a set D into a set S is a rule that assigns a unique element $f(x)$ in S to each element x in D . “

In this definition, D is the domain of the function f . The range R of f is the subset of S consisting of all values $f(x)$ of the function. There are several ways to represent a function symbolically. Venn Diagrams is one of them. By a formula, such as $f(x) = x^3$ which defines a function symbol f to name the function. By a mapping rule such as $x \rightarrow x^3$ (read as x goes to x^3). Also, think of a function f as a kind of machine that produces an output value $f(x)$ in its range whenever we feed it an input value x from its domain.

FINDINGS

At the end of our presentation of the function concept, we assigned a homework of “to read the function topic and do related exercises from their book”. Next week, we gave a short quiz asking the same question of the previous - quiz. No body was able to give the exact definition of the function concept in the second quiz also. Most of the students said that $x=2$ and $y=5$ are not functions because 2 and 5 are constant numbers. All of the students said that $y^2 = x$ and $x^2 + y^2 = 9$ are functions. Again all of the students said that $4y - 3x = 8$ is not a function. Also they could not give correct answers to the (f) and (g) parts of the quiz.

Most of the students entering university’s social branches are not prepared in high school to be successful in General Mathematics course at the university. Those students need a lower level of General Mathematics course such as Pre- Calculus thereby improving their learning process.

CONCLUSIONS

In general, the readiness of the high school students at the General Mathematics Course is very low and alarming. For instance, their Function Concept which is very basic in mathematics is lacking. Today, according to my personal experience as a lecturer, there is no widespread concern over the lack of preparedness of students making the transition from school to university mathematics. One reason for this lies in the fact that a large number of higher education institutions are accepting students from a much wider range of academic backgrounds than was formerly the case.

To teach mathematics with a lecture method at the university level is not recommended. Constructivist approaches are needed to replace the traditional behaviorist teaching approach at the university level also.

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