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THE ROLE OF MATHEMATICAL PHYSICS IN BIOLOGY

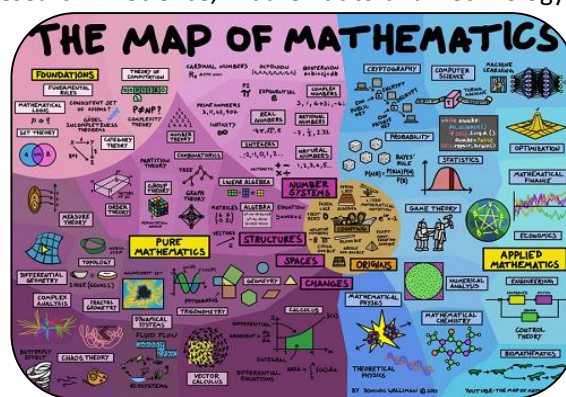
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ABSTRACT

Research in any discipline does not occur in vacuum. For any research endeavor there are antecedent studies on the topic of interest. A feature of studies of research in Science, Mathematics and Technology Education is that is highly localized in terms of its empirical bases. Most of university or college, now believe that it essential to include physics course in the curriculum of biology departments. This study aim at exploring to what extent biology department students are successful in comprehending mathematical concepts. Result can be interpreted as follows "Biology department student find it difficult to comprehend an abstract concept, but they are more successful in solving concrete problems. This situation might be also the reason why these student have chosen biology department, a field not closely related to mathematical physics . Therefore, it might be more logical to each this course in such a way that students can figure out the obstruct structure of mathematics with the help of concrete problems



KEYWORDS : Physics , Biology, Students of Biology Department.

INTRODUCTION

The rapid development in biology in the last 50 years has required an intensive collaboration between biologist and other fields. Due to computer based analysis and experiments facilities that biology department student should be equipped with mathematical knowledge (May, 2004). It is a known fact that it is not adequate to learn about genes, proteins, virus molecules and environmental factors only through biological methods (network and May, 2000). It is quite difficult for biology department students to understand and improve today's biology without having knowledge about single or multi variable functions. Differential equations as well as linear algebra (Newby, 1980) Mathematics, deductive study of numbers, geometry, and various abstract constructs, or structures; the latter often "abstract" the features common to several models derived from the empirical, or applied, Science although many emerge from purely mathematical or logical consideration. Mathematics is very broadly divided in to foundation algebra analysis geometry and applied mathematics which includes theoretical computer science.

Mathematics is used throughout the world as an essential tool in many fields, including natural science, engineering medicine and the social science. Applied mathematics the branch of mathematics concerned with application of mathematical knowledge to other fields. Inspires and makes use of new mathematical discoveries and sometime leads to the development of eternally new mathematical disciplines, such as statistics and game theory. Mathematician also engage in pure mathematics or

mathematics for its own sake, without having any application in mind, although practical applications for what began as pure mathematics are often discovered.

Indeed if they wanted to attend a department using mathematics a lot, they would prefer from Engineering Faculty since such a department would be better for their future carrer and prosperity In addition, it is a known fact that generally all the student in science department are not successful in calculus course and therefore many studies have been conducted concerning this issue (Bloch,2003; Cotrill,Dubinsky,at all; 1996; Eisenberg, 1991 ;Ferrini-Mundy, and Graham,1994 Tall and Vinner, 1981)

METHODOLOGY

For the purpose of the study 150 students of B.Sc. first year (Department of Biology) from Chaudhari charan singh P.G. College (Saifai) Etawah. Selected as the subjects for this study. These students were first taught certain Mathematical physics, Concepts such as function and its limits, continuity and derivation features, and then some applications of these concepts in biology were carried out in the classroom. The total number of the subjects was 150. This group was administered an exam which consisted of four questions. Mainly, there were two types of questions; Type 1 included the first two questions testing mathematical knowledge directly, and other type 2 questions were related to the application of mathematics in biology. Subjects were asked to provide expended responses to questions in the exams. The Exam Administered to the Subjects

Exam 1 if $f(x)=3x^2+5x+2$. Than find the values of roots

Exam 2 If $f(x) = x^3-6x^2+9x+7$ and $g(x) = 3x^2$ prove that $gof(x) \neq fog(x)$

Exam 3 A pharmacologists studying a drug that has been developed to lower cancer disease determines experimentally that the average reduction f in cancer diseases resulting from a daily dosage of x mg of the drug is given by $f(x)=x^3 -6x^2+9x+7$ (The Units are milligram)

(a)Determine the sensitivity oftwo dosage x at dosage levels of 1mg and 3mg.

(b)At which of these dosage levels would an increase in the dosage have the greatest effect?

Exam 4 in a culture, the bacteria counts is 100,000. The number is increased by 10% in 2 hours .In how many hours will the count reach 200,000 if the rate of growth of bacteria is proportional to the number present?

In the evaluation of this exam, the correct solution meant correct calculations with a correct answer. All other situations were considered as a “Wrong answer.” Statistical analysis of the results included percentages and frequencies.

Table 1
STUDENT PERFORMANCE ACCORDING TO QUESTION TYPES

Type 1				Type 2			
Question 1		Question 2		Question 3		Question 4	
N	%	N	%	N	%	N	%
32	21	29	19	96	64	99	66

RESULTS AND DISCUSSION

The performances of the students in the exams are shown in table 1, 20 % of the students gave a right answer to type 1 questions and 65 % to type 2 questions. When these two averages are compared ,it is clear that student are far more successful with type 2 questions which require the use of mathematics in the biology .It can be said that students fins it difficult to find a solution to the problems testing the knowledge of mathematics directly. This result can be interpreted as follows: “Biology department students find it difficult to comprehend an abstract concept, but they are more successful in solving concrete problems. The NSF Graduate Education Strategic plan will serve as the foundation for our efforts in FY 2016 and beyond. NSF expects to focus on: strengthening the professional development opportunities for graduate in all of our programs. Increasing investment through EHR programs in research to better understand how to improve the learning experiences and professional preparation of STE graduate students.

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