THE IMPORTANCE AND RELEVANCE OF TEACHING APPLIED MATHEMATICS IN HIGHER EDUCATION

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ABSTRACT

This article analyzes the challenges in teaching Applied Mathematics in higher education and suggests ways to overcome them. The main purpose of the study is to develop students’ skills in applying theoretical knowledge to real-life situations. The key problem identified is the insufficient understanding of the concept of function, which leads to difficulties in applying mathematical concepts such as derivatives and integrals in practice. As a methodology, mathematical modeling, analysis through real-life examples, and observational approaches were employed. The findings indicate that the use of practical examples and modeling methods increases students’ interest in the subject and fosters the development of skills necessary for their professional careers. In conclusion, it is recommended to widely implement practical examples and modeling approaches in the teaching process.

Keywords: Applied Mathematics, mathematical modeling, function, education, application.

INTRODUCTION

Applied Mathematics provides an opportunity to connect theoretical concepts with real-life situations. The relevance of the topic lies in the fact that today, mathematical models are widely used in economics, healthcare, ecology, information technologies, and other fields. Teaching this discipline in higher education through modern approaches plays a crucial role in developing students’ analytical and creative thinking. The main aim of the research is to improve students’ ability to link theoretical knowledge with practice in the teaching of Applied Mathematics.

METHODOLOGY

The research employs mathematical modeling, analysis of real-life examples, as well as observation and comparison methods. During the learning process, functions, their derivatives, and integrals were explained in connection with practical examples. Moreover, the effectiveness of the discipline was examined through student interviews and observations [1-4].

ANALYSIS

Mathematical knowledge is primarily abstract in nature, whereas Applied Mathematics focuses on solving problems and examples encountered in real life. For instance, issues related to economic and financial indicators, industrial growth, healthcare, environmental research, hydrometeorological data, tourism, historical monuments, human life, psychology, anatomy, factors influencing information processing in the human brain, and data transmission systems are considered. Through such examples, the wide applicability of mathematics is demonstrated.

The use of modern information technologies-such as animations, graphical materials, diagrams, and tables-enriches students' imagination and fosters interest in the subject. While teaching this discipline, students' varying levels of preparedness were also taken into account. Particularly in higher education, the transition to a credit-based system also presupposes the organization of distance learning. From this perspective, the main idea of this article is that without understanding what a function is, it is difficult to comprehend why operations on functions are needed or why derivatives and integrals must be calculated. Indeed, all processes and phenomena can be represented as functions. Even everyday statements can be expressed functionally. For example, the commonly heard expression, *"I am ten times richer than you,"* can be written in the form of a function. Many similar examples can be observed in real life. A complete understanding of functions forms the foundation for acquiring specialized knowledge [5-7].

Applied Mathematics also introduces concepts such as demand and supply, total cost, total profit, net profit, mathematical modeling, and empirical curve fitting. Any real-life process or phenomenon expressed in mathematical terms is called a mathematical model. In algebra, functions are often treated as models. Mathematical models allow predictions about possible outcomes of processes. If the predictions are inaccurate or if experimental results do not match model outcomes, then the model must be revised or abandoned. Any model can be reconstructed by incorporating new data. Typically, mathematical models represent continuous processes. For instance, mathematical models exist that can accurately predict population growth rates.

The algorithm for constructing a mathematical model consists of six stages:

1. Selecting a real-life problem.
2. Collecting relevant data.
3. Analyzing the data.
4. Constructing the model.
5. Testing and refining the model.
6. Explaining and forecasting outcomes.

The analysis shows that students who master the concept of functions through practical examples are better able to understand subsequent mathematical concepts. For example, economic models, demand and supply curves, total and net profit calculations are widely used in practice. Similarly, in architecture and technology, concepts such as slope and gradient, when explained through real-life examples, significantly increase students' interest in the subject.

The application of slope can be observed in many areas of daily life. For example, in road construction, slope percentages such as 2%, 3% and 6% are used to indicate the steepness of a road when ascending a hill. A 3% slope ($3\% = \frac{3}{100}$) means that for every 100 meters of horizontal distance, the road rises by 3 meters [5].

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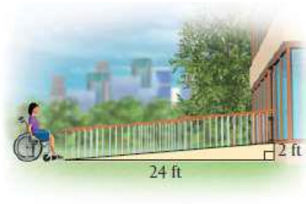

In architecture, the slope of a roof is of great importance: the steeper the roof, the less snow accumulates on it.When designing wheelchairs, slope is also carefully considered. For accessibility, the gradient of a ramp should not exceed $\frac{1}{12}$.

Furthermore, many applications on devices such as iPod, iPhone, and Samsung smartphones can evaluate whether slope levels are correctly or incorrectly set. To understand gradient practically, hold your hand parallel to the ground — this represents a 0^0 gradient. If your hand is raised at a 45^0 angle, the gradient corresponds to 100%; at a 22.5^0 angle, it equals about 41%; and at a 3.5^0 angle, the gradient is only 6%. This is another clear example of how slope is applied in real life [5-9].

Through the above-mentioned examples and problems, we have illustrated several real-life applications of slope and gradient. Such practical applications play a crucial role in preparing students for their future professional activities.

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