The Importance Of The Maple System In The Development Of Professional Competence Of Students Of Technical Higher Education Institutions

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ABSTRACT

In this article, the purpose of the development of professional competence at the present stage of preparation of students of Technical Higher Education Institutions for professional activity is actively revealed, as well as finding solutions to problems encountered in professional activity is demonstrated through the MAPLE system.

Keywords: science, engineering, students, mathematics, competence, professional, education, activity, functions, technical

Introduction

The goal of professional competence development of students of engineering majors at the current stage of preparation for professional activity includes creative work related to the discovery of new ways of solving professional problems [1]. This means that one of the main and only goals of education is that the acquired knowledge becomes a means of developing students' professional competence.

In connection with directing the educational process to creative thinking based on a competent approach, the following problems are of urgent importance [3]:

- creating conditions for students to master the necessary and sufficient knowledge system for fully mastering the basics of professional activity;
- improving the continuous system of acquired knowledge, its goals, methods, means and conditions.
- to expand the possibilities of the practical application of the theoretical knowledge learned in the practical activities of the students during the educational process;

It is necessary to organize creative activities with the development of professional competence of students for a more solid study of professional knowledge [4]. The main task of developing professional competence in future engineers is not only to involve students in the conscious study of theoretical knowledge but also to teach them the basic methods of

applying them to solving practical problems [2].

The main part

In the main problems in the teaching of engineering sciences, it is necessary to carry out technological discovery in the field, which is the training of qualified specialists in engineering sciences capable of professional growth, as well as the development of new technologies for teaching basic knowledge, taking into account innovative approaches. output can be provided [5;6;7]. At the same time, the problem of developing the professional competence of a modern engineer is, first of all, to educate students with the effective use of interactive methods in training sessions [8]. Of course, taking into account that students will be able to use the theoretical and practical knowledge acquired here in their specialities.

In this regard, there is a need to develop and adopt new approaches to the development of professional competence of students of technical specialities [7]. At the moment, the main focus in the training of specialists is highly qualified, professional potential, ready to create and master science-based technologies, and technology transfer [13].

Without basic mathematical training, a modern graduate of the Higher Educational Institutions of the technical direction does not have the opportunity to solve and analyze the scientific, technical and professional problems that arise in his work [9]. For this, a deep understanding of mathematics, the development of mathematical skills, and the development of professional competence in solving real practical problems of mathematics are required in students along with mathematical ability [12]. Thus, the purposeful formation of the ability to solve mathematical problems is a condition for the effective formation of students' professional competencies [13].

In the process of teaching mathematics, students' mastery of mathematical concepts, development of logical-mathematical thinking, problem-based learning, modular teaching, and problem-based approach issues are of great importance for the development of professional competence in students [10]. It requires an approach to the higher education process of improving professional competence based on technological, systematic, operational, competence and innovative approaches [11].

In addition, it is necessary to plan the teaching process in advance, in this process, the teacher should take into account the specific aspect of the educational subject, the place and conditions, and most importantly, the ability and desire of the student, as well as the ability to organize cooperative activities so that the desired guaranteed result can be achieved.

Programs such as Matlab, Mathcad and Maple are widely used in the teaching process. It is worth saying that these programs solve not only the development of science but also the issues of how and where to apply in terms of specialization [6]. With this in mind, we can show the possibilities of determining the solution of problems using the capabilities of the Maple system in order to develop professional competence in students by solving some problems and constructing graphs of some functions as follows:

In the following problems, we will see the problems of determining and constructing the type of line shooting from five points in the plane using the capabilities of the Maple system [14-18].

To add, subtract, multiply, and perform operations on vectors, we use operations from the Maple system " ***LinearAlgebra Student [LinearAlgebra], Physics:–Vectors, VectorCalculus*** " packages.

Performing linear operations on vectors whose coordinates are determined.

In space $A(7;2;2)$, $B(5 ; 7 ; 7)$, $C(4 ; 6 ; 10)$, $D(2 ; 3 ; 7)$ points are given.

Maple program:

> restart; with(Student [LinearAlgebra]): with(VectorCalculus): with(Physics:–Vectors): infolevel [Student [LinearAlgebra]] := 1:

Calling the package of geometry operations in space:

> with(geom3d):

Identifying a point in space:

> point(A, 7, 2, 2), point(B, 5, 7, 7), point(C, 4, 6, 10),

point(D, 2, 3, 7):

Determining vectors based on the coordinates of given points:

> x1:=7: y1:=2: z1:=2: x2:=5:y2:=7:z2:=7: x3:=4: y3:=6: z3:=10: x4:=2:y4:=3:z4:=7:

> ABx:=x2-x1;ABy:=y2-y1;ABz:=z2-z1;

$ABx := -2 ABy := 5 ABz := 5$

> AB_ :=ABx*_i +ABy*_j + ABz* _k;

$AB\_ := -2\_i + 5\_j + 5\_k$

> a_:=AB_; $a\_ := -2\_i + 5\_j + 5\_k$

> ACx:=x3-x1;ACy:=y3-y1;ACz:=z3-z1;

$ACx := -3 ACy := 4 ACz := 8$

> AC_ :=ACx* _i + ACy*_j +ACz*_k;

$AC\_ := -3\_i + 4\_j + 8\_k$

> b_:=AC_; $b\_ := -3\_i + 4\_j + 8\_k$

> ADx:=x4-x1;ADy:=y4-y1;ADz:=z4-z1;

$ADx := -5 ADy := 1 ADz := 5$

> AD_ :=ADx* _i +ADy*_j +ADz*_k;

$AD\_ := -5\_i + \_j + 5\_k$

> c_:=AD_; $c\_ := -5\_i + \_j + 5\_k$

#Construction of a parallelogram built on vectors VA and VB:

> VectorSumPlot(<ax, ay, az>, <bx, b2, bz>, axes=boxed); (Figure 1)

sum = <-5, 9, 13>

Multiplication by a vector number:

> d_:=2*a_+3*b_; $d\_ := -13\_i + 22\_j + 34\_k$

> Ve:=2*Va+3*Vb;

$Ve := -13e_x + 22e_y + 34e_z$

> VectorSumPlot(2*<ax, ay, az>, 3*<bx, b2, bz>, , axes = boxed output=animation); (Figure 2)

sum = <-13, 22, 34>

Construct VB vectors from VA:

> EqA:= a_- b_; $EqA := \_i + \_j - 3\_k$

> Vd:=Va-Vb; $Vd := e_x + e_y - 3e_z$

>VectorSumPlot(<ax, ay, az>, -<bx, b2, bz>, , axes=boxed, output=animation, view= [-5. . 10, -8. . 10, -10. . 5]);

(Figure 3)

sum = <1, 1, -3>

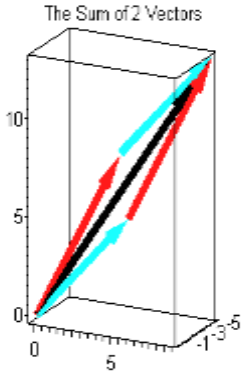

Figure 1.

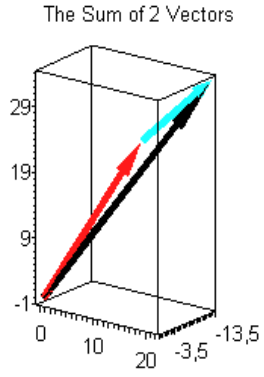

Figure 2.

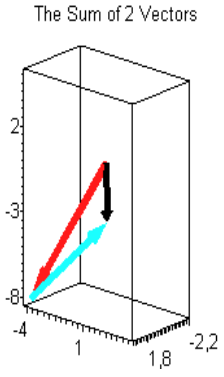

Figure 3.

Today, information and information technologies have penetrated every aspect of science. They serve to facilitate human activity. If it is shown that the above-mentioned problems can be performed with the help of certain programs and students are taught to solve them independently, the learning process would be not only interesting but also useful, along with the development of professional competence in students.

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