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MOTIVATIONAL FACTORS AND ACHIEVEMENTS OF ENGINEERING STUDENTS WHILE STUDYING MATHEMATICS

Today, the professional training of specialists in most fields is based on mathematical training, since, in addition to the actual knowledge that the study of mathematical disciplines gives a specialist, mathematics occupies an important place in the formation of their scientific worldview, the development of logical and abstract mathematical thinking, logical rigor in judgments, the ability to mathematize situations, related to future professional activities. Since mathematics is well known as an academic discipline where there can be problems with understanding as well as maintaining a positive attitude, students' motivation to learn plays an extremely important role in their learning behavior. Motivated students are more likely to exert effort to learn material, use effective self-regulation strategies, persevere, and demonstrate higher levels of achievement. In contrast, unmotivated students will not exert effort because of counterproductive beliefs they hold about their own abilities or the value of the learning material.

In the first semester of the 2023-2024 academic year, an anonymous survey was conducted of 194 undergraduate engineering majors of the Ivano-Frankivsk National Technical University of Oil and Gas (IFNTUNG). According to the submission form, the questionnaire contained questions on a Likert scale. When working with the scale, students rated their degree of disagreement or agreement with each statement: 1 – completely disagree; 2 – do not agree; 3 – somewhere in the middle; 4 – agree; 5 - completely agree. It was suggested to answer the following questions:

1. Were you interested in studying school mathematics?

2. Are you interested in mathematical subjects at the university?

3. Are you making enough effort to study mathematical subjects at university?

4. Do you have difficulties when studying mathematical disciplines at the university?

5. Are you sure that you will be able to acquire knowledge and skills in mathematical disciplines at the university?

6. Do you consider mathematical knowledge necessary for your future educational and career aspirations?

7. Do you worry during control activities in mathematical disciplines at the university?

8. What is your level of knowledge in mathematical disciplines?

Processing of the survey results was carried out using the statistical data analysis package STATISTICA (StatSoft, Inc.).

Spearman's rank correlation coefficient will be used to study the relationship between the factors underlying students' motivation to study mathematics and the level of mathematical knowledge. Factors such as interest in school and university mathematics courses, sufficiency of applied effort and orientation to success in acquiring knowledge and skills in mathematical disciplines at university, as well as the useful value of mathematical knowledge for future educational and career aspirations have positive and significant ranks correlation coefficients with the level of mathematical knowledge.

In addition, non-parametric analogues of univariate analysis of variance were used: the Kruskel-Wallis H-test and the median test. The level of students' knowledge was chosen as an independent (coding) variable, that is, 5 groups of students with different levels of knowledge were obtained from the lowest 1 to the highest 5. The Kruskel-Wallis test is based on ranks and tests the hypothesis H0: whether the samples have the same distribution or the same distribution with the same median. The median test counts the number of observations in

each sample that fall above or below the overall sample median. Table 3 displays the results of the H - Kruskel-Wallis test, namely: the value of the H criterion statistic (4.194) and the probability p of accepting the H0 hypothesis based on the answers to each of the questions 1-7 (motivational factors), as well as the average of the ranks in each formed by level of knowledge of the group. Table 4 shows the results of the median test for each characteristic of motivation: the value of the criterion statistic and the probability p of accepting the H0 hypothesis, as well as the number of students in each group whose average value of factors is less than (or equal to) the overall median, and - greater than the overall median.

According to the Kruskel-Wallis test, differences between groups of students with different levels of knowledge are significant for motivational factors 1, 2, 3, 5, 6.

Spearman's rank correlation coefficient was used to investigate the relationship between interest in learning mathematics at school and all other factors. Except for factor 7, all others have significant rank correlation coefficients with school interest in learning mathematics (positive for 2,3,5,6,8 and negative for 4). Such results indicate that the attitude towards the subject is formed already in school years.

Based on the results of the research, it was established that the factors that have a statistically significant relationship with the level of knowledge in mathematical disciplines are: the intrinsic value of mathematics - interest; useful value for future educational and career aspirations; self-regulation - sufficient effort to study mathematical disciplines; self-efficacy – confidence in the ability to acquire knowledge and skills in mathematical disciplines at the university. Some of these factors related to mathematics proficiency are amenable to intervention in educational settings. But it is not an easy task in higher education, since students come to a higher educational institution already

having experience of educational activities at school, and therefore, with a certain level of formation of these activities.

We associate the prospects of further research with the search for tools for identifying and supporting unmotivated students to prevent a drop in academic success in the disciplines of the mathematical cycle.