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## СОВРЕМЕННЫЕ ТЕХНОЛОГИИ И МЕТОДИКИ ОБУЧЕНИЯ

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<https://doi.org/10.48081/YCSC6418>**N. F. Abayeva\*, L. M. Mustafina, V. V. Zhurov, A. R. Yarullina**Karaganda Technical University,  
Republic of Kazakhstan, Karaganda**SOME FEATURES OF THE MATHEMATICAL KNOWLEDGE  
FORMATION OF TECHNICAL UNIVERSITY STUDENTS**

*Given article reveals a topic of the teaching mathematics' features at a technical university. The teaching mathematics' problem is an urgent one that needs to be addressed immediately, in the near future today's students will have to develop all branches of science and technology in the Kazakhstan, and they are quite negatively regarded to the mathematics study, and hence they have low grades of academic performance. Scientists around the world have repeatedly proved that currently without knowledge of the mathematical apparatus the science's movement is impossible, since mathematics provides powerful methods for knowledge of the world, as well as for studying its laws. In order to apply mathematics as a research method, it is very important to realize and master the essence and interconnection of ideas and concepts, and for this we suggest developing interest to the mathematics study. The given article proposes methods of mathematics study development constructed by the authors and analyzes the obtained results.*

*Key words: mathematical knowledge, educational process, student performance, career counseling, pedagogical conditions.*

**Introduction**

Mathematization is a process which now with extraordinary speed penetrates deeper and wider into all spheres of human activity. Mathematics development has essential impact on the other sciences and technology development. In turn, the practice's tasks, the other sciences development lead to the creation of new mathematics branches. By that reason, the mathematics application area is

constantly increasing. Recently, thanks to the rapid computers development in the mathematical methods use has taken place a strong leap [1]. They began to be applied not only in areas where mathematics has been used for a long time (physics, chemistry, etc.), but also in areas where the mathematics application was not possible until recently. This penetration is complicated by the technical disciplines remoteness from mathematics. In order to successfully apply mathematical methods in any application area, to study some problem, first of all, one needs to have the necessary mathematics knowledge and needs to be able to correctly use the mathematical apparatus. In order to record ongoing research and the obtained results, the following are used: the numbers language, various mathematical symbols and verbal logical descriptions.

At research mathematics is necessary, since in mathematics the validity of the considering fact is proved not by checking it on a multiple examples, which does not have evidentiary value, but by a purely logical way. The correct choice of method is the key to success at any mathematical proof, as the result there will be much more useful information about the studied subject than previously thought. This is due to the fact that the mathematical apparatus is fraught with a lot of hidden information in itself, so that formulas can give much more useful information than expected from them. In order to apply mathematics as a research method, it is very important to realize and master the essence and interconnection of ideas and concepts.

### **Materials and methods**

Objects of the mathematics study are models. In these models, mathematics studies relationships between elements, quantitative and qualitative, the connections between them, their form. The same mathematical model can with a certain approximation describe the real phenomena properties and given phenomena are very far from each other in their concrete content. The mathematics abstractness gives to it strength, universalism and community. Mathematics provides powerful methods for knowledge of the world, as well as for studying its laws. Mathematics and its component – analysis quantitative methods – play an important role in the specialists training. They allow with a sufficient degree of reliability to analyze the practical activities results. Mathematical modeling of some innovative processes is a relatively young, rapidly developing and already well-established research method. However, one cannot fail to note the insufficient awareness of specialists in this area and, consequently, a certain lag in scientific and technical applications of mathematical modeling.

The natural science development history convincingly indicates about a high efficiency of the natural sciences mathematization. (A quantitative, mathematical description of natural phenomena takes science to a higher level and deepens

processes understanding, and occasionally it is the only way to connect an action of numerous interconnected and sometimes quite diverse factors that are characteristic to the considering phenomena, into a single, whole picture) One of the most common branches that are related to daily work is the research data's statistical processing. Mathematical methods also play a significant role in solving problems. Mathematical methods application plays an important role in planning an experiment. As mentioned above, the mathematical model not only provides known phenomena's quantitative description, but also given model allows us to predict new results and effects. Finding out these predicted effects existence is one way to verify the mathematical model's validity. Models in many cases provide detailed information about the processes than the available general technical methods. With every year, an assessment of the validity of quantitative indicator, that are obtained in the scientific research process, and an assessment of the validity of conclusions and practical suggestions that are built on these indicators basis are stronger becoming the part of scientific work and practice methodology.

Modern platform of higher education does not take into account the students' mental characteristics, such as the memory, attention, and fast reading development. Without introduction of the effective methods of the transfer and information assimilation by students, all the efforts that are taken in modern conditions will be futile [2, p. 133].

However, technical university students, that are studying mathematics as a freshman, still are quite far from modern technologies, where mathematical knowledge are used, therefore in learning process teachers are faced with a problem: reluctance to study mathematics [3, p. 347].

In order to solve this problem was held psychological and educational literature analysis, which allowed defining that by cognitive interest development to the «Mathematics» discipline study one can achieve increase in the mathematical knowledge level.

### **Results and discussion**

During work process, we have identified pedagogical conditions that are promoting cognitive interest development in the mathematics study in a technical university. The following conditions were defined as pedagogical conditions:

– approach to learning: mathematical education in a technical university should be represented not only in the mathematical science's logic, but also in the student's future professional activity's logic;

– learning methods: problematic, reproductive, research, partially search (heuristic);

– a set of instruments for the cognitive interest development: problem lectures; problem tasks of professionally-oriented content; test tasks with professional orientation.

In order to determine the level of cognitive interest formation, there are defined a criteria for its development in the mathematics study in a technical university and are identified indicators and levels. As a result of the conducted experimental checking of the pedagogical conditions effectiveness, there were obtained following results: at a high level, the difference between the established criteria average values in the control and experimental groups is 12.3 %, at the sufficient level is 14.1%, at the low level is 26.4 % (Figure 1). Thus, the cognitive interest development level to the mathematics study in the experimental group compared to the control group increased by 17.6 % (Figure 2) [4, p. 19].

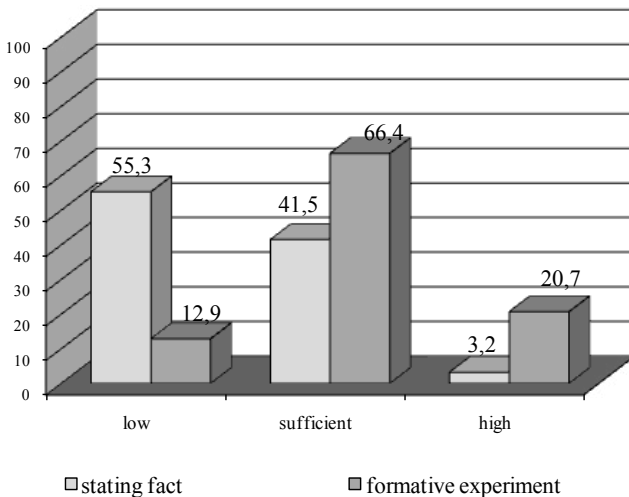


Figure 1 – The cognitive interest formation level to the mathematics study in the experimental group

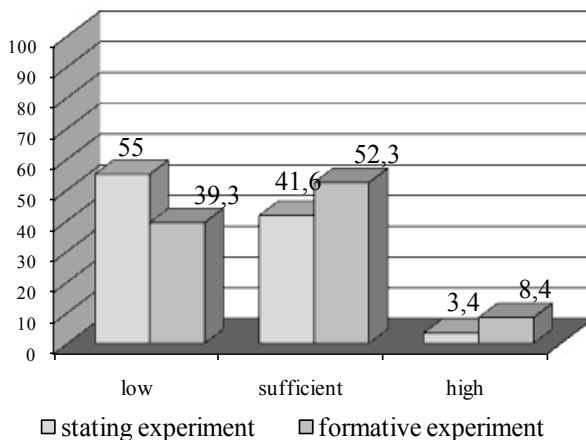


Figure 2 – The cognitive interest formation level to the mathematics study in the control group

### Conclusions

In order to check a proposed assumption that the introduction into the technical university's educational process the pedagogical conditions of cognitive interest development to the mathematics study will increase the students' mathematical knowledge level, there was held an analysis of the final students performance, who were involved in the experiment by "Mathematics" discipline. The research results showed that students of the experimental group have a higher level of mathematical knowledge than students in the control group, since the students' results in the experimental group are on average 0.45 points higher than in the control group, which is 9 % (Fig. 3).

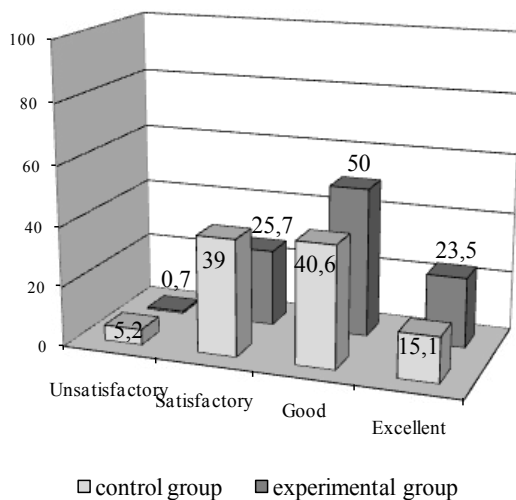


Figure 3 – Final performance results by the “Mathematics” discipline

Following recommendations were made based on the results that were obtained during the experimental pedagogical work:

- the success of the cognitive interest development in the mathematics study by technical university’s students is ensured by pedagogical conditions, which it is advisable to implement in combination;

- constructed pedagogical conditions of cognitive interest development to the mathematics study by technical university’s students can be used during learning process of other universities.

## References

1 **Golovachyova, V. N., Vafin, A. S.** Osobennosti razrabotki smart-tehnologii monitoringa znanij i povysheniya kvalifikacii professional’nyh kadrov predpriyatiya // Vestnik Pavlodarskogo gosudarstvennogo universiteta imeni S. Torajgyrova, 2019. – № 4. – P. 95–102.

2 **Zhumazhanov, S. K.** Problemy formirovaniya kompetencij pri obuchenii v vysshej shkoly // Vestnik Pavlodarskogo gosudarstvennogo universiteta imeni S. Torajgyrova, 2018. – № 4. – P. 1-132–135.

3 **Abayeva, N. F., Mustafina, L. M., Yerakhtina, I. I., Zhurov, V. V., Alimova, B. Sh.** Development of cognitive interest in the study of mathematics



among students majoring in mining // *Option Journal*, University of Zulia, ve., Venezuela, Año 33. – No. 85. – 2019. – P. 344–361.

4 **Abayeva, N. F., Mustafina, L. M., Zhurov, V. V., Yerakhtina, I. I., Akhmetov, K. M.** K voprosu povysheniya kachestva matematicheskikh znanij u studentov tekhnicheskogo vuza // *Vestnik Pavlodarskogo gosudarstvennogo universiteta im. S. Torajgyrova*, 2019. – № 3. – P. 15–21.

5 **David C. Geary, Daniel B. Berch, Kathleen Mann Koepke.** Chapter 1 – Introduction : Cognitive Foundations for Improving Mathematical Learning. *Cognitive Foundations for Improving Mathematical Learning Learning*, Vol. 5 in *Mathematical Cognition and Learning*. – 2019. – P. 1–36. – <https://doi.org/10.1016/B978-0-12-815952-1.00001-3>

6 **Carolyn A. Maher, Robert Sigley, Peter Sullivan, Louise C. Wilkinson.** An international perspective on knowledge in teaching mathematics. *The Journal of Mathematical Behavior*, Vol.51. – September 2018. – P. 71–79. – <https://doi.org/10.1016/j.jmathb.2018.05.002>

7 **Ann Dowker,** Foreword: Cognitive Foundations for Improving Mathematical Learning. *Cognitive Foundations for Improving Mathematical Learning*, Vol. 5 in *Mathematical Cognition and Learning* 2019. – P. 13–20. – <https://doi.org/10.1016/B978-0-12-815952-1.09988-6>

8 **Alison Clark-Wilson, Celia Hoyles.** From curriculum design to enactment in technology enhanced mathematics instruction – Mind the gap! *International Journal of Educational Research*. – Vol. 94. – 2019. – P. 66–76. – <https://doi.org/10.1016/j.ijer.2018.11.015>

9 **Sigve Hogheim, Rolf Rebera.** Supporting interest of middle school students in mathematics through context personalization and example choice, *Contemporary Educational Psychology*. – Vol. 42. – July 2015. – P. 17–25. – <https://doi.org/10.1016/j.cedpsych.2015.03.006>

10 **Anita Pipere, Inta Mierīņa.** Exploring non-cognitive predictors of mathematics achievement among 9th grade students, *Learning and Individual Differences*. – Vol. 59. – October 2017. – P. 65–77. – <https://doi.org/10.1016/j.lindif.2017.09.005>

11 **Abayeva, N. F., Yegorov, V. V., Golovachyova, V. N., Mustafina, L. M., Yerakhtina, I. I., Mustafina, B. M.** About Professional Orientation of the Mathematics as a Discipline for Students Majoring in Biotechnology. // *Indian journal of science and technology*: Volume 9. – Issue 19. – May, 2016. – P. 93891. – <https://doi.org/10.17485/ijst/2016/v9i19/93891>

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### **ТЕХНИКАЛЫҚ ЖОО-НЫҢ СТУДЕНТТЕРІНДЕ МАТЕМАТИКАЛЫҚ БІЛІМДІ ҚАЛЫПТАСТЫРУ ЕРЕКШЕЛІКТЕРІ ТУРАЛЫ**

*Мақалада техникалық ЖОО-да математиканы оқытудың ерекшеліктері тақырыбы ашылып көрсетілген. Математиканы студенттерге оқыту, ешқандай артқа шегініссіз, тезірек шешуді қажет ететін сұрақтардың бірі, себебі жақын болашақта Қазақстанның ғылымы мен техникасының барлық салаларын дамыту қазіргі студенттерге жүктелмек, ал олардың математиканы оқуға ынталары жеткіліксіз, сәйкесінше пән бойынша үлгерімдері нашар. Математика әлемді танудың, оның заңдылықтарын түсінудің күшті әдістерін беретіндігін әлем ғалымдары дәлелдеген болатын. Сондықтан да, қазіргі таңда ғылымның дамып, алға жылжуы математикалық білімсіз мүмкін емес. Математиканы зерттеу әдісі ретінде қолдану үшін оның түпкі мәнін, ұғымдары мен негізгі идеялары арасындағы өзара байланысты түсініп, жақсы меңгеру қажет, сол үшін біз математиканы оқуға қызығушылықты дамытуды ұсынамыз. Мақалада оны дамытудың авторлар әзірлеген әдістемесі және талданған нәтиже ұсынылған.*

*Н. Ф. Абаева\**, *Л. М. Мустафина*, *В. В. Журов*, *А. Р. Яруллина*  
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### **ОБ ОСОБЕННОСТЯХ ФОРМИРОВАНИЯ МАТЕМАТИЧЕСКИХ ЗНАНИЙ У СТУДЕНТОВ ТЕХНИЧЕСКОГО ВУЗА**

*Статья раскрывает тему особенностей преподавания математики в техническом вузе. Вопрос о преподавании математики является насущным, требующим незамедлительного решения, так как сегодняшние студенты, которым в недалеком будущем предстоит развивать все отрасли науки и техники в Казахстане*

*достаточно негативно относятся к изучению математики, и, следовательно, имеют низкие баллы успеваемости. Ученые во всем мире неоднократно доказывали, что без знаний математического аппарата движение науки, в настоящее время невозможно, так как математика дает мощные методы для познания мира, а также для изучения его закономерностей. Для того чтобы применять математику как метод исследования, очень важно осознать и хорошо освоить сущность и взаимосвязь идей и понятий, а для этого мы предлагаем развить интерес к изучению математики. В данной статье предлагаются, разработанные авторами методики его развития и анализируются полученные результаты.*

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