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<https://doi.org/10.48081/BGQF2060>***A. M. Bazarbayeva¹, G. I. Salgarayeva²**^{1,2}Kazakh National Women's Teacher Training University,
Republic of Kazakhstan, Almaty¹ORCID: <https://orcid.org/0000-0002-8810-196X>²ORCID: <https://orcid.org/0000-0001-9477-6245>*e-mail: bazarbayeva.a@qyzpu.edu.kz**APPLICATION OF PRACTICE-ORIENTED METHODS
BY IT FACULTY IN HIGHER EDUCATION**

This qualitative study was conducted among teachers specializing in information technology from various higher educational institutions in Kazakhstan. The study aims to investigate the frequency of application of certain practice-oriented teaching methods in IT education, how often they are mentioned in syllabuses, and how much they coincide with real-world applications. The study also sheds light on how higher education institutions support teachers in applying practice-oriented methods and what obstacles teachers experience in applying these teaching methods. As part of the study, a survey was conducted among 102 participants representing various higher education institutions in 11 regions of the Republic of Kazakhstan to obtain the most extensive and diverse sample. During the survey, Likert scales were used, which allowed us to get more detailed and nuanced answers from the respondents. In addition, multiple-choice questions were included, further expanding the opportunities for participants to express their opinions. The SPSS-29 software toolkit was selected and successfully applied during the data analysis. The important results found in this study make a scientific contribution by expanding our knowledge about the most frequently used methods of practice-oriented learning, the barriers to the use of these methods, and the frequency with which these methods are mentioned in the syllabus. This study also provides valuable information for IT education researchers who aim to improve the quality and effectiveness of training of IT specialists in higher education.

Keywords: higher education, teaching methods, practice-oriented methods, IT faculty questionnaire, statistical analysis.

Introduction.

In today's educational world, various methods and technologies are applied to teach various disciplines, aiming to enhance students' skills and knowledge. Schools, colleges, and universities use practice-oriented teaching methods, which are one of the most common methods at all levels of education.

Practice-oriented teaching methods are methods that focus on improving the skills and knowledge of learners for further practical application in the workplace. However, in addition to "practice-oriented learning", scientific works use the term "practice-based learning". Practice-oriented learning focuses on incorporating real-life experience into the learning process, emphasizing interaction with practitioners in the field [1]. In this case, teaching aims to develop students' skills and knowledge by immersing them in practical experiences that bridge the gap between theory and practice [2]. Meanwhile, practice-based learning involves using real-life situations as a basis for learning, encouraging students to apply theoretical knowledge in practical scenarios [3]. Both approaches mentioned above enhance students' understanding of concepts and develop critical thinking and problem-solving skills. Often these methods are intertwined in the application, and sometimes the line between grounded and practice-oriented methods (POM) can be difficult to find. By integrating such methods into instruction, institutions can better prepare students for their future profession by providing a more effective and engaging learning experience.

Various studies emphasize the importance of practice-oriented approaches in various educational institutions, showing positive student learning outcomes [4]. Many studies also emphasize the benefits of creating a practice-oriented educational learning environment that meets the requirements of educational standards and influences learning efficiency improvement [5; 6]. Today, university teachers apply a large number of practice-oriented methods in their classes. The most common of them are project technologies, problem-based learning technologies, and case studies [7].

All these methods in the aggregate further contribute to the mastering of solid professional and interpersonal skills, which consequently helps to be able to compete in the labor market, better meet the expectations of employers, quick adaptation in the workplace during employment, etc. In this connection, this paper is devoted to the actual problem of the application of practice-oriented methods in teaching IT specialists in higher educational institutions of Kazakhstan and will show what methods and how often are used by teachers of IT disciplines, as well as what support and what obstacles teachers face in the way of applying these methods.

Research Questions

RQ1: To what extent do the teachers of IT departments of Kazakhstani HEI apply practice-oriented teaching methods?

RQ2: How often are practice-oriented methods provided in teachers' syllabuses, and do they correspond to the actual application?

RQ3: What measures of support from the university and what obstacles do teachers experience in the application of practice-oriented teaching methods?

Both research papers and recruiting platforms extensively address the issue of graduates's preparedness for the intensive and competitive labor market. For example, studying the labor market of the IT industry in Kazakhstan through HeadHunter and LinkedIn platforms, one can see a very high demand for IT specialists in various spheres such as banks, medical institutions, and companies for the production and processing of raw materials, energy, education, and many others. This proves that competition among IT specialists in the labor market exists, and universities should pay attention to the expectations and requirements of employers when training students.

Insufficient interdisciplinary connections throughout university studies hinder a comprehensive understanding of the profession, resulting in an absence of a holistic system of knowledge, skills, and abilities required for a future specialist in the future professional career [8]. Previously, such researchers as Kurbatova, Aisner, Rusakov, Naumkina, Bunduyk, Logachev, Semenova, Kulibaba, and others have described the application of practice-oriented methods in the teaching process. For example, Khujina, in her research, integrated the expertise of teachers and employers to create a training course that incorporates practice-oriented elements, and the materials of these interactive courses are used in the process of laboratory classes and independent work of students [9]. This has shown good results in motivation and autonomy, and practice supervisors from organizations have given positive feedback on students' competencies after taking this course.

According to Timoshchenko and Razhkov's work on the experience of the Republic of Belarus, the "University 3.0" model now places significant emphasis on practice-oriented learning in the higher education system to enhance the personal and professional competencies of graduates as future specialists [10]. This once again shows the relevance and effectiveness of practice-oriented methods in education.

Many works in foreign literature also emphasize the benefits of practice-oriented learning, including developing students' ability to solve programming problems and the acquisition of personal, interpersonal, and technical skills. Ribeiro and Bittencourt, in their study, integrated object-oriented programming, data structures, and software development into an undergraduate computer

engineering program, demonstrating the impact of problem-based learning on student performance [11].

The Kazakhstani authors Karstina surveyed teaching staff to evaluate the significance of various methods in engineering student preparation, revealing the importance of practice-oriented methods but not the frequency of their use [12].

In conclusion, research papers provide significant insights into the importance, problems, and benefits of practice-oriented learning in computer science, along with various pedagogical methods employed in this field. Nevertheless, it is crucial to note that although papers offer valuable perspectives, they do not address strategies for using a specific practice-oriented method in computer science teaching and its content.

Materials and methods. Figure 1 illustrates the design of this quantitative study, which consists of several successive stages described below.

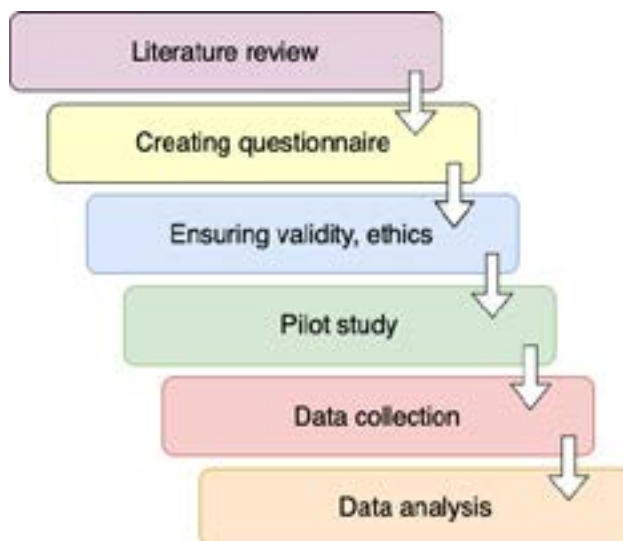


Figure 1 – Research design

Validity. Once the initial version of the questionnaire questions has been created, the validity of the questionnaire becomes a crucial consideration. Since it is important to apply the principle of content validity during the development of a new tool in the IT field. In general, content validity involves evaluating a new survey instrument to ensure that it includes all items that are essential and excludes undesirable items for a particular subject area [13]. To ensure the content

validity of the questionnaire, the content validity ratio (CVR), which is a linear transformation of the proportional level of agreement on how many experts in a group rate an item, was used, meaning that experts from various universities in Kazakhstan and a foreign expert were involved for this purpose.

Ethical issues. The next stage was the ethical committee's review of the study, which was approved by Kazakh National Women's Teacher Training University's Scientific Ethics Committee (protocol №2 dated March 27, 2024). All participants were informed about the purpose and the stages of the research. Research ethics refers to the moral principles underlying the design and execution of research projects that involve observing and recording others' lives. The respondents were assured of the confidentiality of their information and the result's availability to them upon request. This paper includes the data obtained and analyzed during the research process.

Pilot study. This was followed by a pilot study, which provided researchers with preliminary data enabling them to get an idea of the possible results of the planned experiment. In the pilot phase of the study, 12 respondents were involved, and the data obtained demonstrated the applicability and helped predict the survey outcome. Some respondents gave feedback and commented on the survey design, which helped to reformulate some of the questions. For example, you can ask participants to rate the clarity of your instructions or the complexity of the questions. However, it should be noted that pilot studies are not used to test hypotheses because, in this case, the scale of the ongoing study is not the focus of the study.

Data collection and respondents. The main data collection process took place throughout May 2024, which included an online questionnaire among teaching staff of IT departments of universities, in which 102 respondents from 11 regions of Kazakhstan participated. Table 1 displays the data on the survey participants, while Figure 2 illustrates the data on IT areas where the online questionnaire respondents teach.

Table 1 – Table of frequency of respondents

Gender	Absolute and relative frequencies	Experience	Absolute and relative frequencies	Region	Absolute and relative frequencies
Male	34 (33.3%)	less than 3 years	12 (11.8%)	Almaty city	48 (47.1%)
Female	68 (66.7%)	from 3 to 5 years	8 (7.8%)	Astana city	13 (12.7%)

		from 5 to 10 years	12 (11.8%)	Almaty region	1 (1%)
		from 10 to 20 years	24 (23.5%)	West Kazakhstan region	15 (14.7%)
		more than 20 years	46 (45.1%)	Abay region	3 (3%)
				East Kazakhstan region	3 (3%)
				Aktobe region	7 (6.9%)
				Karagandy region	4 (3.9%)
				Zhetysu region	4 (3.9%)
				other regions	4 (3.9%)

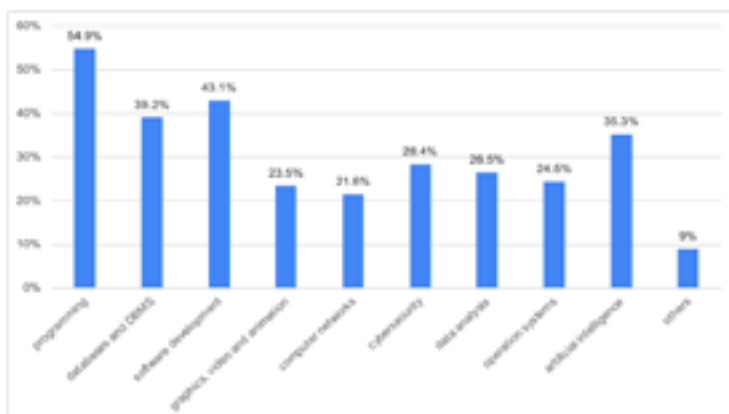


Figure 2 – IT areas taught by the respondents

Data analysis. All the collected data were added to SPSS-29 software and analyzed using various tests. The reliability of the questionnaire was assessed using Cronbach's alpha method with a result of 0.768. It is still accepted in science education that an alpha value reaching a somewhat arbitrary value of 0.70 is a sufficient indicator of the reliability or internal consistency of an instrument [14]. To identify the type of distribution of the variables, the Kolmogorov-Smirnov criteria were taken into consideration, which showed a non-normal distribution. According to distribution studies, non-normal distribution is less common than other types of distribution [15]. Researchers need to be aware of whether their

variables of interest follow a normal or non-normal distribution. This factor plays a key role, as it directly affects how the data will be described and analyzed. Depending on the type of distribution, the approach to data analysis may change. Therefore, determining the type of distribution to use in the study is necessary before starting the research.

A descriptive statistical analysis was conducted to demonstrate the results in tables and graphs and to give a quantitative description of the data using a set of statistical indicators. The Spearman correlation coefficient was also calculated to see if there was any correlation.

Results and discussion. RQ1: To what extent do the teachers of IT departments of Kazakhstani HEI apply practice-oriented teaching methods?

Figure 3 displays the frequency of application of specific practice-oriented teaching methods by teachers in HEI classes, while the mean value and standard deviations are presented in Figure 4.

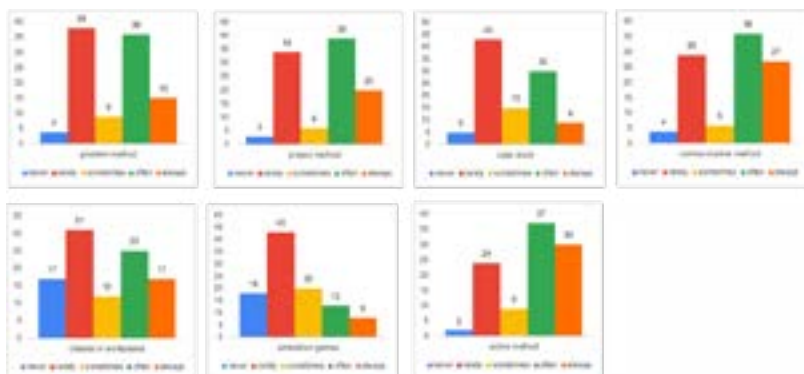


Figure 3 – The frequency of application of practice-oriented methods by teachers

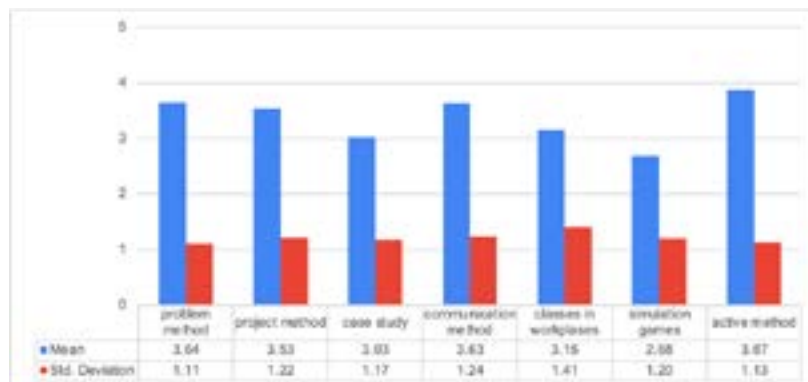


Figure 4 – Mean and standard deviation of using methods

The research paper analyzes the mean of sample-standard deviations from a population to understand its relationship with the concentration of the data in the population. The questionnaire used a Likert scale with coding from 1 to 5, where 1 is «never» and 5 is «always». A mean of <3 indicates less frequent use, a mean of 3 indicates moderate use and a mean of >3 indicates more frequent use. Also, the weighted mean value in this section was equal to 3.32, and the average standard deviation (SD) was 1.24.

According to Figure 4, the mean value of 3.87, $SD = 1.13$, indicates a high frequency of application of the active method, followed by a mean value of 3.64, $SD = 1.11$, and the mean value of 3.63, $SD = 1.24$, respectively, which also indicates the frequent application of problem-based and communication methods. In addition, the project method also has a relatively high mean value of 3.53, $SD = 1.22$, and the lowest mean values are 3.15, 3.03, 2.68, and SD are 1.41, 1.17, and 1.20, respectively.

The questionnaire also revealed that practice-oriented teaching methods in 83.3 % of cases are used in practical classes; 57.85 % of respondents noted that they use such methods in laboratory classes; and only 25.49 % of teachers use these methods in the self-work of students.

RQ2: How often are practice-oriented methods provided in teachers' syllabuses, and do they correspond to the actual application?

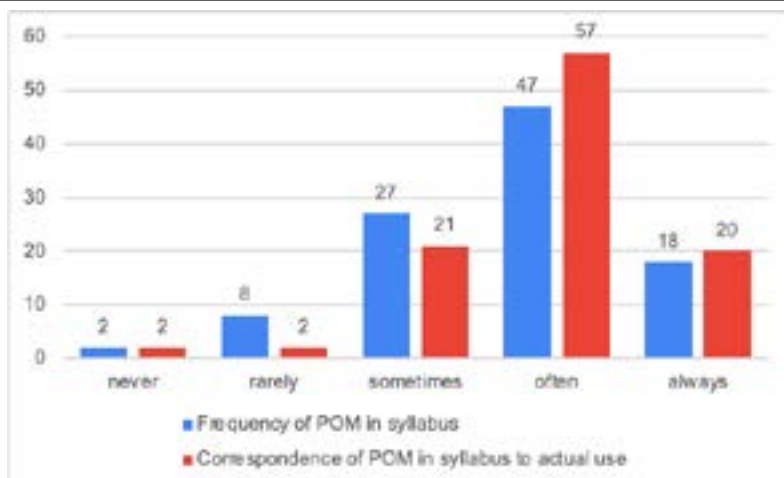


Figure 5 – Frequency of use and correspondence of POM in the syllabus

The average score for practice-oriented methods as stipulated in the syllabus is 3.70, with a standard deviation (SD) of 0.92. This value indicates that the teacher uses these methods frequently.

This provides a clear insight into the teacher's teaching approach and the level of integration of the practice-oriented methods into their teaching routine. This is a positive indication of the teacher's commitment to the implementation of these methods, which are known for their potential to enhance the learning experience.

Furthermore, when we compare the actual use of practice-oriented methods in the teaching process with their description in the syllabus, we find a mean value of 3.89, accompanied by a standard deviation of 0.81.

This data clearly shows a strong correlation between what is officially outlined in the curriculum and what is implemented in the real-world educational process, particularly in terms of the use of practice-oriented methods. This observation is of great significance as it provides clear evidence of the accuracy and reliability of the curriculum methods. Furthermore, it serves as an indicator of the teacher's commitment to adhering to the curriculum, which is crucial for maintaining a consistent and high-quality educational environment.

RQ3: What measures of support from the university and what obstacles do teachers experience in the application of practice-oriented teaching methods?

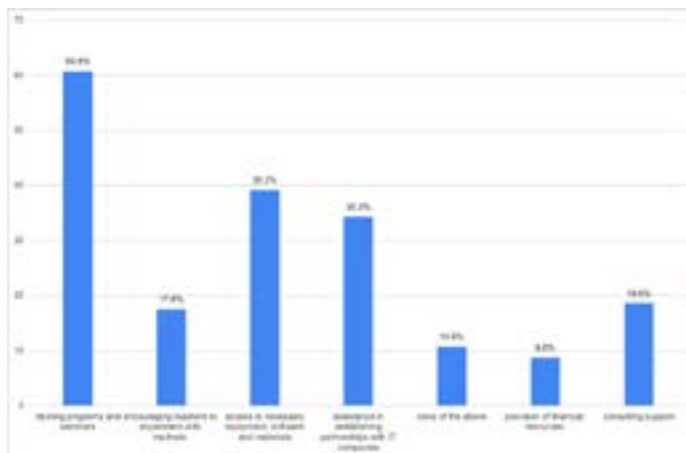


Figure 6 – Support from the university in the application of practice-oriented methods

Figure 6 presents information indicating that training programs and seminars are the most popular ways to support teachers in using a practice-oriented approach to learning. These activities, organized by the HEIs, provide teaching staff with the opportunity to exchange ideas, discuss modern teaching methods and approaches, as well as to teach new methods and techniques. This allows teachers to improve their skills and confidence in applying a practice-oriented approach to learning. It is noted that universities actively promote the establishment and development of partnerships with companies that work in the field of information technology. This is confirmed by the fact that 34.3 % of all respondents indicated the participation of universities in building professional relationships with stakeholders, which allows universities and companies to work together to create and improve educational programs, ultimately resulting in the training of more qualified specialists in the field of information technology.

18.6 % and 17.6 % of respondents also confirmed that their educational institutions actively initiate and provide consulting support in the development, experiment, and implementation of new teaching methods, which allows teachers and students to experiment and develop new approaches. However, 10.8 % of respondents expressed the opinion that the university does not provide them with any support; this is a rather serious indicator that deserves attention. At the same time, only 8.8 % of teachers noted that the university provides them with financial support.

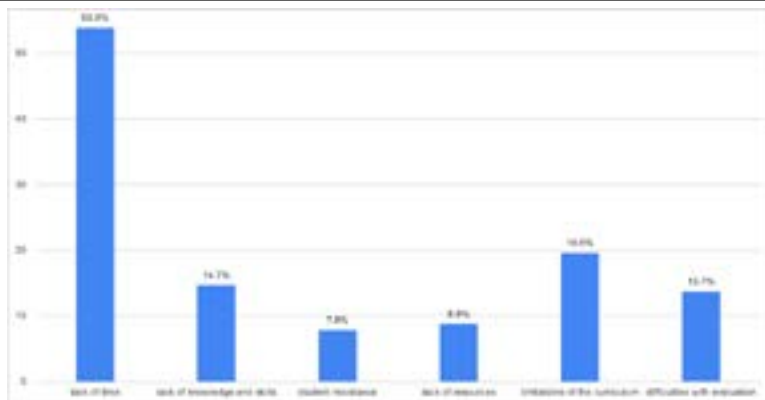


Figure 7 – Obstacles in the application of practice-oriented methods

Regarding the obstacles faced by teachers in applying practice-oriented methods, Figure 7 demonstrates that the main obstacle to even more frequent and effective use of these methods is the lack of time (53.9 %). This emphasizes the challenges of managing time effectively during the teaching process. It is also known that universities' teaching staff, in addition to their teaching and methodological responsibilities, also engage in research, extracurricular activities, and educational work and sometimes suspend efficiency and quality in all areas, which is not always easy. All other indicators were much lower. For example, 19.6 % of the respondents mentioned the limitations in educational programs and syllabuses as an obstacle. Lack of knowledge and skills as well as assessment difficulties were mentioned by 14.7 % and 13.7 % of the respondents, respectively. Moreover, indicators such as lack of resources of various kinds and students' resistance to the use of practice-oriented teaching methods become an obstacle for 8.8 % and 7.8 % of teachers, respectively, in using these methods.

Additionally, Spearman's correlation analysis revealed positive correlations between applications of several practice-oriented teaching methods. Table 2 shows positive correlations between active methods and several other methods, such as active and problem methods, with a value is 0.439, active and design methods with a value of 0.473, and active and communicative methods, where the correlation value is 0.549. Along with this, conducting classes at the workplace positively correlates with the use of problematic, active, and simulation methods with indicators of 0.404, 0.418, and 0.490, respectively. We also observe a correlation of 0.420 between the communicative approach and the project method. However, the r_s of $0.3 < 0.5$ indicates the average correlation [16].

Table 2 – Correlation matrix

		problem method	project method	communicative method	active method	simulation games
communicative methods	Spearman's rho	0.234*	0.420** *	—		
	df	100	100	—		
	p-value	0.018	< .001	—		
active methods	Spearman's rho	0.439***	0.473** *	0.549***	—	
	df	100	100	100	—	
	p-value	< .001	< .001	< .001	—	
classes in workplaces	Spearman's rho	0.404***	0.300**	0.368***	0.418** *	0.490***
	df	100	100	100	100	100
	p-value	< .001	0.002	< .001	< .001	< .001

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Also in the section obstacles faced by teachers when applying practice-oriented methods, there is a very high correlation $r_s = 0.938$ between lack of resources and student resistance, which is visible in Table 3.

Table 3 – Correlation matrix

		lack of resources	student resistance
lack of resources	Spearman's rho	—	
	df	—	
	p-value	—	
student resistance	Spearman's rho	0.938***	—
	df	100	—
	p-value	< .001	—

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

The scientific works of Boukhris, Treesirichod and Linh say that students' attitudes toward practice-oriented methods are positive; they even support different practice-oriented methods and believe that they positively affect different aspects of the educational process [17; 18; 19]. When, as in this study, 7.8% of teachers noted the resistance of students to one of the obstacles in the application of practice-oriented methods and these indicators, as indicated above, have a high level of correlation with the indicator of lack of resources. This can be explained as follows: education in the field of computer science requires considerable resources such as high-speed Internet, licensed programs, and technical equipment, but not every university has the ability to fully provide the material and technical base, which can lead to learning difficulties. Babayi recommended improving infrastructure and enhancing the well-being of students and teachers through adequate funding, as this has a significant impact on the level and quality of application of various teaching methods [20].

Conclusions.

Teachers of IT departments of various higher education institutions in Kazakhstan actively apply practice-oriented teaching methods, especially in practical classes, which contribute to the direct application of acquired knowledge and skills. The curricula's description of these methods and their practical application significantly align, confirming their effectiveness and compliance with established standards. Training programs and workshops offered by training institutions are the most popular forms of support for teachers to help them improve their professional skills and techniques. However, there are also obstacles in the work of teachers, such as lack of time and restrictions in syllabuses and educational programs, which require additional efforts to find optimal solutions and approaches.

Researchers in the field of IT education and specialist training, particularly in Kazakhstan, can greatly benefit from this research. Since the issue of training IT specialists is prevalent in many countries worldwide, including Kazakhstan, a comprehensive search for the primary problem and its solution is necessary. In this article, we have addressed the problem of teaching a practice-oriented method.

In conclusion, the practical significance of the study is that all proposed recommendations can be used by teachers, heads of HEIs, and other scientific researchers to deepen their understanding of the application of practice-oriented learning and its impact on the effectiveness of the educational process.

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ЖОҒАРЫ ОҚУ ОРЫНДАРЫНДА АҚПАРАТТЫҚ ТЕХНОЛОГИЯЛАР ОҚЫТУШЫЛАРЫНЫҢ ПРАКТИКАҒА БАҒЫТТАЛҒАН ӘДІСТЕРІН ҚОЛДАНУЫ

Бұл сапалық зерттеу Қазақстанның түрлі жоғары оқу орындарының ақпараттық технологиялар саласында жұмыс жасайтын оқытушылары арасында жүргізілді. Зерттеудің басты мақсаты – ақпараттық технологияларды оқыту саласында белгілі бір практикаға бағытталған білім беру әдістерін жұмыс барысында қолдану жиілігін, олардың оқу сиалабустарында қаншалықты жиі кездесетінін және іс-жүзінде оны қолданумен қаншалықты сәйкес келетінін зерттеу. Зерттеу сонымен қатар жоғары оқу орындарының оқытушыларға практикаға бағытталған әдістерді қолдануда қалай қолдау көрсететінін және оқытушылардың осы оқыту әдістерін қолдануда қандай кедергілерге тап болатынын көрсетеді. Зерттеу аясында Қазақстан Республикасының 11 өңіріндегі әртүрлі жоғары оқу орындарында қызмет атқаратын 102 респондент арасында негүрлым ауқымды және алуан түрлі іріктеме алу мақсатында сауалнама жүргізілді. Таратылған сауалнамада Лайкерт шкалалары қолданылды, бұл бізге респонденттерден егжей-тегжейлі және мағыналы жауаптар алуға мүмкіндік берген еді. Сонымен қатар, бірнеше жауап беруге болатын сұрақтары енгізілді, бұл қатысушылардың өз пікірлерін білдіру мүмкіндіктерін одан әрі кеңейтті. Жиналған деректерді талдау мақсатында SPSS-29 бағдарламалық құралы таңдалды және сәтті қолданылды. Осы зерттеуде алынған маңызды нәтижелер практикаға бағытталған оқытудың ең жиі қолданылатын әдістері, оларды пайдаланудағы кедергілер және оқу сиалабустарында осы әдістерді пайдалану жиілігі туралы білімізді кеңейту арқылы маңызды ғылыми үлес қосады. Бұл ғылыми жұмыс сонымен қатар жоғары оқу орындарында осы саладағы мамандарды даярлаудың сапасы мен тиімділігін арттыруға ұмтылатын ақпараттық технологиялар және білім беру саласындағы зерттеушілеріне құнды ақпарат береді.

Кілтті сөздер: жоғары білім, оқыту әдістері, практикаға бағытталған әдістер, ақпараттық технологиялар оқытушыларының сауалнамасы, статистикалық талдау.

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ПРИМЕНЕНИЕ ПРАКТИКО-ОРИЕНТИРОВАННЫХ МЕТОДОВ ПРЕПОДАВАТЕЛЯМИ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ В ВЫСШИХ УЧЕБНЫХ ЗАВЕДЕНИЯХ

Это качественное исследование было проведено среди преподавателей, специализирующихся в области информационных технологий, из различных высших учебных заведений Казахстана. Цель исследования – изучить частоту применения определенных практико-ориентированных методов обучения в сфере образования информационных технологий, насколько часто они упоминаются в учебных планах и насколько они совпадают с его применением. Исследование также проливает свет на то, как высшие учебные заведения поддерживают преподавателей в применении практико-ориентированных методов и с какими препятствиями сталкиваются преподаватели при применении этих методов обучения. В рамках исследования был проведен опрос среди 102 участников, представляющих различные высшие учебные заведения в 11 регионах Республики Казахстан, с целью получения наиболее обширной и разнообразной выборки. В ходе опроса использовались шкалы Лайкерта, что позволило нам получить от респондентов более подробные и содержательные ответы. Кроме того, были включены вопросы с несколькими вариантами ответов, что еще больше расширило возможности участников выражать свое мнение. В ходе анализа данных был выбран и успешно применен программный инструмент SPSS-29. Важные результаты, полученные в этом исследовании, вносят важный научный вклад, расширяя наши знания о наиболее часто используемых методах практико-ориентированного обучения, препятствиях на пути их использования и частоте упоминания этих методов в учебных курсах. Это исследование также предоставляет ценную информацию исследователям образования в сфере информационных технологий, которые стремятся повысить

качество и эффективность подготовки специалистов этой сферы в высших учебных заведениях.

Ключевые слова: высшее образование, методы преподавания, практико-ориентированные методы, анкетирование преподавателей ИТ, статистический анализ.

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