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Formation of soft skills for future IT specialists at the university

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Abstract

Relevance. The development of digital technologies and the formation of demand for software products provoke an increase in the popularity of IT professions. This leads to an increase in the number of professional staff and competition for jobs. That is why the implementation of comprehensive training of specialists is now relevant for universities. It is necessary that future specialists not only have professional knowledge, but also be able to quickly adapt to changes in work, respond normally to them, and perform tasks in critical conditions.

Purpose. The goal of the scientific paper was formed, which was to study the process of forming soft skills in university students in IT specialties.

Methodology. For this purpose, the method of analysis, synthesis, comparison, deduction, abstraction, generalization was used in the article.

Results. Scientific paper was written on the basis of Akhmet Yassawi International Kazakh-Turkish University. The research found that a modern IT specialist faces various difficulties and problems in the course of their professional activities. To successfully overcome them and perform the tasks at a high level, the future employee needs to acquire soft

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skills. It has been established that they are successfully reflected both in the career development of a specialist and in their personality traits. The paper revealed the main types of soft skills, as well as described their essence.

Conclusions. The research proved that the formation of this type of skills among students is a prerequisite during the organization of the modern educational process at Akhmet Yassawi International Kazakh-Turkish University. The practical value of the results obtained in the course of scientific research lies in the fact that they can be used in the development of curricula and programs for the training of future IT specialists.

Keywords: industry 4.0; programming; professional training; additional education; communication.

Introduction

Currently, the global IT community is undergoing significant changes, which are provoked by an increase in demand for digital products and software. This is reflected in the number of specialists and the youth labor market in this area. Given the demand for digital objects, there are now around 30 million software developers [1]. This indicator is growing rapidly, due to the relevance of vocational education, which is associated with the IT environment. Due to such changes, competition in the labor market is significantly increased, which in turn increases the number of requirements for candidates [2]. For successful employment and professional actualization in the future, students must take a comprehensive approach to the development of their competence. This is due to the fact that they must acquire not only theoretical knowledge, but also practical skills. In addition, the constant change of established institutions obliges true professionals to quickly adapt to the updated needs of the market. All this concerns the soft skills responsible for the development of the personal qualities of a specialist. They are responsible for the implementation of professional duties, taking into account external factors that complicate this process. Thus, soft skills allow the student to adapt to innovations and perform their tasks in any conditions. This is valued by modern employers as they prefer candidates who not only have a high level of industry knowledge, but also developed personal qualities [3].

Thus, at the moment, the relevance of the development of soft skills is quite high. This trend is quite natural, since many other factors depend on the level of development of these skills in the course of the implementation of professional tasks by a specialist, for example, speed, efficiency, quality and productivity of work. That is why soft skills are gradually becoming obligatory in society and are an indispensable component of the professional competence of an individual. Based on this, there is a need to modify approaches to the educational and professional training of students in higher educational institutions. This is due to the relevance of soft skills and their role in modern society. Future IT specialists should improve all their skills, both professional and personal, already at the training stage. This approach is the key to successful employment and the development of a professional career in the future. The problem of scientific paper is to express the peculiarities of the formation of soft skills in students of IT specialties at the university. This issue is not new in the pedagogical scientific doctrine, since a number of scientists have already studied its various aspects.

For example, C. Succi and M. Canovi [4], W. Lyu and J. Liu [5] concluded that the success of a candidate in the modern IT labor market is extremely influenced by the level of development of their soft skills. They believe that

the development of such skills should take place at the university in the form of a separate academic discipline. The obtained conclusions can be used in the course of describing approaches to increase the level of development of students' soft skills. R. Lavi et al. [6], M.K. Zholdakhmet and A.G. Murzagalieva [7] revealed the peculiarities of the formation of soft skills within the educational process. They came to the conclusion that it is possible to develop such skills in students in the course of studying various academic disciplines and using educational tools. This is important for highlighting ways to improve the level of development of soft skills in the course of educational and professional training of future specialists. J. A. Rios et al. [8] revealed the most common soft skills that employers pay attention to. They include analytical thinking and innovation, strategic approach to education, systematic approach to problem solving. This conclusion can be used in the work when assessing various soft skills and the priority of their acquisition by students.

Based on the foregoing, the goal was formed in the study, which was to analyse the ways of forming and developing soft skills in students of IT specialties during their preparation at the university. To do this, the following tasks were formed: to define the concept of soft skills; reveal their structure and features; compare them with "hard skills"; reveal the role of soft skills for a future specialist; describe ways to increase their level of professional competence by acquiring such skills.

Materials and Methods

The method of analysis in scientific paper was used to divide the general object of study into its structural elements. In particular, such components as soft skills, students, IT-sphere were highlighted. Based on this method, their essence and features were revealed, which enabled comparing them with each other. The analysis was carried out in the course of studying the types of soft skills acquired by IT specialists during their studies at Akhmet Yassawi International Kazakh-Turkish University (AYIKTU). This method allowed determining the role of each of them in the future activities of a specialist. The analysis assumed revealing the peculiarities of the characteristics mentioned above individually from each other. This was necessary to establish the structure of scientific paper. The synthesis method was used to combine individual concepts. It enabled establishing links between the components of the object of scientific paper. The synthesis was used to describe their features and properties, which should be taken into account in the formation of soft skills. This method is also necessary for the formation of a single object of scientific research, taking into account the properties and characteristics of each of its components.

The comparison method in the article was applied when comparing different categories and concepts. On its basis, various types of soft skills were identified and compared with each other. The comparison involved the identification of the most priority approaches among those used in AYIKTU for the formation of soft skills in students. Based on this method, the peculiarities of the educational and professional training of students were established through conventional approaches and those aimed at developing soft skills. The comparison method was used to express the requirements of the modern labor market in the IT environment by comparing candidates with and without developed soft skills. This method was also necessary to describe the characteristics of the activities of IT specialists in comparison with other types of professional activities. The method of deduction in scientific paper enabled investigating specific objects and subjects at the expense of knowledge about general concepts. On its basis, the essence of soft skills was highlighted in the article, taking into account knowledge about the usual professional skills of a future specialist. Deduction revealed the importance of soft skills for students of IT specialties through understanding the general process of educational and professional training. This method was used to express individual properties of soft skills in the system of skills of a highly qualified specialist.

The method of abstraction was used in scientific paper to reveal the content and system of soft skills. Accordingly, special attention was focused on the characteristics of such skills in modern society and the IT environment. Abstraction made it possible to reveal the process of formation of various soft skills without taking into account other peculiarities of the educational and professional training of future specialists. This method was applied to express the priority of soft skills and their independent role and professional activities of the individual. The method of generalization was used in the article to evaluate the results and express priority vectors for the development of soft skills in the course of students' educational activities at the university. On its basis, knowledge about the features of such skills was systematized and their influence on the level of professional competence and competitiveness of the future specialist was considered.

Results

The training of future IT specialists at the university should be based on a systematic approach. Accordingly, in addition to professional skills, student must develop soft ones. This is due to the peculiarity of the modern labor

market, which requires from the candidate not only high knowledge in subject disciplines, but also developed personal qualities. Moreover, according to Deloitte Access Economics, two-thirds of jobs in various fields will require high levels of soft skills from candidates by 2030 [9]. In order to characterize the peculiarities of the formation of soft skills in student programmers, one should investigate their essence [10].

The category "soft skills" should be understood as the personal properties that are necessary for interaction in a team and self-organization of a specialist. These include communication skills, creativity, leadership, emotional intelligence, critical thinking [11]. Based on this, "hard skills" imply professional skills in a specific IT specialty. The spread of soft skills took place in 1959, when the commanders of the US military began to notice that the effectiveness of the actions of a group of soldiers depended not only on the technique of their use of weapons, but also on a person who leads them and shapes the communication [12]. Based on this, it can be established that soft skills are "super professional" and play an important role in the workflow. They affect the performance of a specialist and are not associated with a specific type of employment. It is also advisable to include organizational, presentational, communication, and managerial skills in the category of soft skills. Thus, a characteristic feature of soft skills is their versatility, since they contribute to the professional development of a specialist in various fields or activities.

Students pursuing higher education in the IT field also need to develop soft skills, namely social-communicative, cognitive and emotional. The first category includes communication skills that provide interpersonal communication of specialists, the possibility of implementation in team work. Leadership, social intelligence, as well as responsibility for specific actions are developed in this case. As for the cognitive component of soft skills, it includes critical thinking, the ability to quickly solve problems, as well as innovative approaches to professional tasks. These skills allow the future IT specialist to manage the intellectual load, engage in self-development, improve information skills and develop time management. The attributes of specialists should also include their components of emotional intelligence, namely honesty, optimism, flexibility, creativity, motivation. It should be noted that the above skills are not mutually exclusive, so a future specialist can systematically develop all categories of soft skills to increase their competitiveness in the modern labor market. According to a study by the World Economic Forum, 8 skills were identified that leading specialists should have by 2025 [9] (Figure 1).



Figure 1. Top 8 soft skills that will be in demand until 2025

It is advisable to consider what place the above skills occupy in AYIKTU and how they are formed among students of IT specialties. Analytical thinking includes the ability of an individual to process data and information. The correct understanding and evaluation of certain phenomena and processes depends on the level of development of this skill. Analytical thinking plays an important role in the curriculum of IT specialties at AYIKTU, especially in the context of the formation of the professional competence of future specialists. This is due to the fact that it is often necessary to systematize and organize data, as well as to find connections or differences between them. Based on this, it can be seen that the development of analytical thinking in students allows them to more quickly break down large problems into smaller tasks, collect information and check it against established criteria, determine the relationship between phenomena, not to get lost in the fast flow of information.

Particular attention should be paid to the active and strategic approach to learning that dominates AYIKTU. This is because today's conditions are changing at an incredible rate, so skills need to be updated. Moreover, new tools and professions appear every year, so it is important to learn and keep your knowledge up to date. In the course of the paper, an IT specialist often encounters complex multi-aspect tasks. Therefore, complex problem solving is an important skill for them. This will allow a specialist not only to overcome complex tasks, but also to respond normally to unexpected critical situations. During the educational and professional training of future IT specialists at AYIKTU, teachers explain and prepare them for the fact that they will often deal with changes in the requirements for their projects. The joint work of students is important, aimed at focusing on a specific task, without excitement and fear.

Similar to the previous critical thinking skill, an IT specialist often encounters unexpected problems in their

work. Therefore, AYIKTU pays special attention to preparing future specialists for working with clients, which can be difficult. For example, a client may insist on using a particular technology or software. However, it does not take into account product scaling and other project properties. In this case, future specialists perform special tasks aimed at developing the ability to objectively assess the situation, select the most effective method for implementing the order, and constructively prove their arguments to the client. According to a report by Hart Research Associates, 93% of employers consider the critical thinking skill to be the most important for candidates [13].

At AYIKTU, it is during the training of IT specialists that special attention is paid to such soft skills as creativity, originality and initiative. This is due to the fact that difficulties may arise in the work on the project, which will provoke significant changes in the work. In order for a specialist to timely and efficiently perform the work, they need to quickly and originally respond to such situations. In addition, one more example can be given that demonstrates the priority of the above qualities. In particular, IT professionals often work with limited resources. Therefore, students develop their creativity in the course of training at AYIKTU in order to effectively solve critical situations and fulfil their future professional tasks at the highest level. Despite the significant spread of artificial intelligence and other digital technologies, it should be noted that creativity is a unique characteristic of a person, so it cannot be replaced by any mechanized algorithm. Thus, special attention in AYIKTU is paid specifically to the creative abilities of applicants for higher education [14; 15].

Since the future work of an IT student involves both individual and team work, skills such as leadership and social influence are developed during their studying at AYIKTU. Their priority is due to the fact that a living

person can inspire and lead a team. It is impossible to transfer this duty to robots or other artificial intelligence mechanisms. At the same time, the presence of a leader is a prerequisite in teamwork, since this is its basis. The culture of the group, the overall productivity and the quality of the work done depend on this subject. In the course of educational and professional training at AYIKTU, students acquire the skills to rally people around a common goal. This allows them to rationally distribute professional tasks in teamwork, completing projects in the shortest possible time and with high efficiency [16-20].

IT professionals often perform work related to the development of technologies and software. This process is stressful because it creates a number of problems and shortcomings that need to be addressed. In addition, IT specialists often cooperate with clients personally, which also requires a certain psychological preparation [21; 22]. All this leads to the development of stress resistance and flexibility. These soft skills allow remaining calm in any critical situation. Therefore, during the preparation of students of IT specialties in AYIKTU, various circumstances and conditions are simulated so that applicants can develop their skills in combining professional and personal qualities. Stress resistance also affects the result of the work, since it allows a specialist to control the entire process and prevent it from being exposed to irritating factors.

It is appropriate to include communication and argumentation skills in the list of soft skills. They are based directly on the interaction of a specialist with a customer. Communication is the key to concluding a contract and receiving orders. That is why special attention in the preparation of students at AYIKTU is paid to developing the skills of building a dialogue and arguing one's opinion. This will allow future IT specialists to effectively interact not only with people from the IT environment, but also with other industries. They can avoid arguments and provide constructive conclusions through arguments to support their position. Therefore, in recent years, the following disciplines have been developed and introduced into the educational program for the training of future ICT specialists: Theory of Leadership, Fundamentals of Entrepreneurship and Business, Project and Process Management, Start-up Engineering (additional course of study) [23-26].

Having considered the main types of soft skills that students of IT specialties acquire at AYIKTU, it is appropriate to determine the methods, on the basis of which educators determine the level of their development. These approaches are also often used by employers to test candidates' soft skills. This indicates the priority of approaches in AYIKTU, as they help to increase the level of competitiveness of graduates in the labor market. Before this, educators use projective questions. For example, a student is asked their attitude to a particular situation or phenomenon. When answering, the applicant will describe their position based on their own experience, so it will be more honest and reveal professional and personal personality traits. Also, educators at AYIKTU use the PARLA method (Problem; Action; Result). It involves a dialogue with a future IT specialist according to the level of their knowledge and skills. Such communication is built as follows: description of the problem; student's actions to

solve it; result of these actions; new things and skills a future specialist learned. The use of such an approach at a university allows applicants for education to develop soft qualities, including stress resistance, flexibility, and logical reasoning.

The case method, which is also called situational interviews, should be used to further develop the process of forming soft skills in students of IT specialties in AYIKTU. It allows the teacher to determine the level of soft skills of a future IT specialist, as well as their way of thinking when performing professional tasks. At a university, an educator can independently develop such cases, and students, in turn, can solve them. This process should be accompanied by an analysis of the conditions and the establishment of effective ways to solve existing problems. As a result, it will be possible to expand the range of soft skills for future IT specialists. It also uses psychological training to develop and improve soft skills.

From the foregoing, it can be seen that soft skills are the skills that make up the personality of a specialist. Compared to professional skills, they are more difficult and require more effort to develop them. This is due to the fact that the former can be obtained at a high level through training and work. In turn, soft skills require a systematic development of the personality, its qualities and character traits. These two categories of skills are interrelated and have a direct impact on the level of competence of a future IT specialist. Therefore, the development of soft skills should occur simultaneously with the training of students. As a result, they will be able to effectively interact with people, feel confident in the labor market, as well as improve the quality of work and services.

Discussion

The peculiarities of the development of soft skills in students have been studied by many scientists. They reveal this issue from different angles, so the positions of researchers may have disagreements. In particular, E.B. Habecker [17] and J. Brooks [18] paid special attention to such a soft skill as leadership. Researchers believe that this element is a key element in the activities of every specialist, including the IT field. The absence of a leader makes it impossible to implement the functions and professional tasks of a team of employees. They argue that a leader can not only inspire others, but also improve the quality of their work. That is why, in the process of training future specialists, it is necessary to promote the development of their skills in controlling, planning and organizing the work process. The researchers drew attention to the fact that true professionals in the IT environment can not only fulfil individual orders at a high level, but also develop group work vectors and ensure normal collective activity. Since they considered the process of educational and professional training of students, they managed to note that leadership competence, like soft skills, occupies an important place not only in their future professional activities, but also in their educational activities. This indicates that a modern highly qualified specialist must have both a high level of professional knowledge and prompt adaptation to external changes. To do this, they need to be able to find ways to solve complex unexpected problems, as well as lead a team. In their work, researchers drew attention to the fact that the main task of

vocational education is to train specialists in a certain area in order to acquire a high level of competence and competitiveness. The findings have common features with the results of this research. This is reflected in the fact that modern employers require candidates to be ready for continuous professional development, increasing social and professional mobility [27; 28]. Accordingly, it should be noted that leadership competence is one of the fundamental aspects of the training of future specialists.

In turn, V. Osadchyi et al. [19] explored the role of stress tolerance in the activities of future IT professionals. In their paper, they revealed the concept of this skill as a set of features that allow the body to provide activity without taking into account the actions of stressors. Stress resistance involves avoiding harmful outbursts of emotions that are negatively expressed as a result of the work of a specialist and can cause mental disorders [29]. Researchers believe that there is a certain relationship between these components, and the lower the level of emotionality is, the higher is the degree of stress resistance. They analysed various types of stressors that can affect IT professionals, such as interactions with a customer, employer, and colleagues. In the course of professional training, students are also exposed to stress factors, so they must develop their own level of stress tolerance. This is possible due to the passage of psychological and other training. The researchers paid special attention to the structural elements of stress tolerance. In particular, control, since people who are self-organized and disciplined are less likely to experience stress and are able to solve problems faster [30]. Another element is attitude, since stress resistance implies a person's strong belief in positive phenomena. Responsibility is also an important component, since it allows a specialist to adhere to obligations to different subjects, thereby avoiding the appearance of stress factors [31]. Researchers note that the level of stress resistance affects the success and quality of the specialist's performance of their tasks. The revealed position is intertwined with the conclusions drawn from this research. What is common is the analysis of stress resistance as an important soft skill of a leading specialist in the field of IT.

Unlike previous researchers, K. Tsirkas et al. [20] and K.N. Qizi [21] explored the general concept and role of soft skills. They found that the activity of the current labor market indicates the emergence and spread of a systemic increase in requirements for specialists. Soft skills are becoming especially popular. In their opinion, this is due to the fact that every employer expects from candidates not only professional knowledge, but also developed erudition, the ability to avoid disputes, and a creative approach to solving problems. They formed the concept of soft skills, which should be understood as a system of non-specialized professional skills that affect the success of a specialist, their productivity. They are not associated with a particular branch of professional activities. The researchers note that the formation of soft skills in future specialists, in particular IT specialties, should be considered not only as an educational trend, but also as a modern need. The latter, in turn, is formed as a result of the influence of economic and technological changes in society [32; 33]. They consider it necessary to introduce a special academic discipline on the basis of universities, which will provide for the direct development of soft skills among applicants

for education. In their opinion, this approach will help to increase not only the level of competence of graduates, but also their competitiveness in the future. The researchers also propose to organize cycles of thematic events within the framework of universities for the implementation of educational activities and professional practice. Such events are aimed at preparing major IT specialists to work in crisis conditions, placing them in non-standard situations [34-36]. The described results have many features in common with the conclusions of this paper. In particular, the approach to the development of soft skills in students directly during the entire educational process is similar. As a result, they are expected to develop the ability to quickly respond to changes in the work process, the desire for self-improvement and positive communication with other actors.

D. Gunagle [22] studied the importance of soft skills in the modern labor market. She analysed the current requirements of employers for candidates in various fields. As a result, she was able to establish that the level of competitiveness of a specialist depends on the level of development of soft skills. At the moment, the presence of soft skills is a prerequisite for all categories of workers [37]. This is due to the fact that the modern labor market requires specialists to be able to qualitatively analyse and evaluate materials, improve management skills, as well as communication [38-40]. Separately, the researcher notes that the development of soft skills should take place not in the course of building a professional career, but also in the process of student's educational and professional training. That is why, in her opinion, it is necessary to form the educational process in universities, combining both professional tasks and non-standard ones, aimed at developing creative thinking, self-development of the individual. Soft skills need to be constantly updated, due to the dynamic change in social relations [41]. Based on this, in order for the level of soft skills of specialists to be at a high level, they need to carry out continuous training. A similar conclusion was reached in this research. It is proved that a modern successful specialist is characterized by two mandatory features, namely, a high level of knowledge in a particular specialty and the presence of a wide range of soft skills [42; 43].

Based on the foregoing, one should agree that the labor market is undergoing reform. This necessitates changes in the algorithm for training specialists, in particular, in the field of IT. That is why the leading place at the moment is occupied not only by the professional knowledge of a specialist, but also by the level of development of their soft skills. It directly affects the quality and productivity of the work that the specialist performs. The development of such skills is a complex process, and therefore, the common thing in the analysed papers of scientists is that students must acquire soft skills while still studying at a university.

Conclusions

As a result of the research, it was possible to describe the priority of the formation and improvement of soft skills among students of IT specialties. A number of advantages that future specialists acquire when acquiring the above skills have been proven and revealed. In particular, the peculiarities of the current state of the labor market in the IT field are described. Based on this, it was found that the

requirements of employers for modern candidates are formed from both professional skills and soft qualities. That is why their formation is extremely important in the course of educational and professional training of a future specialist at AYIKTU.

Within the framework of the article, the essence of soft skills was determined. They lie in the ability of the individual to perform their professional functions in different conditions, taking into account changes in projects, adapt to them and control their emotions. To analyse the different types of soft skills, it was found what are the most common and priority among employers. Based on this, the research reveals the peculiarities of the formation of such skills as analytical thinking, a strategic approach to education, a systematic approach to problem solving, critical thinking, creativity, originality, initiative, leadership, stress resistance, and argumentation in AYIKTU. All of them were studied as part of this paper, and their role in the work of an IT specialist was also revealed. Thus, a system of soft skills was considered that future IT specialists should master while still studying at a university. This is possible through the implementation of different approaches and tools for both individual and group work. Moreover, such skills should be formed in

students along with special knowledge, so there is no need to introduce separate academic disciplines.

At the moment, it is important for AYIKTU to select and organize the educational process in such a way that students in the course of educational and professional training can simultaneously develop theoretical professional knowledge, as well as soft skills. This approach is the key to increasing the level of professional competence of graduates and the development of IT personnel in the state. To do this, in future scientific papers, attention should be paid to ways to increase the competitiveness of students in IT specialties, taking into account modern requirements of the labor market.

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Conflict of Interest

None.

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Формування soft skills у майбутніх ІТ-спеціалістів в університеті

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Анотація

Актуальність. Розвиток цифрових технологій та формування попиту на програмні продукти провокують зростання популярності ІТ-професій. Це призводить до збільшення кількості професійних кадрів та конкуренції за робочі місця. Саме тому для університетів зараз актуальним є впровадження комплексної підготовки фахівців. Необхідно, щоб майбутні фахівці не тільки володіли професійними знаннями, а й вміли швидко адаптуватися до змін у роботі, нормально на них реагувати, виконувати завдання в критичних умовах.

Мета. Сформовано мету наукової статті, яка полягала у дослідженні процесу формування м'яких навичок у студентів університетів ІТ-спеціальностей.

Методологія. Для цього у статті використано методи аналізу, синтезу, порівняння, дедукції, абстрагування, узагальнення.

Результати. Наукова робота написана на базі Міжнародного казахсько-турецького університету імені Ахмета Яссаві. У ході дослідження було виявлено, що сучасний ІТ-спеціаліст у процесі своєї професійної діяльності стикається з різними труднощами та проблемами. Щоб успішно долати їх і виконувати поставлені завдання на високому рівні, майбутньому працівникові необхідно набути м'яких навичок. Встановлено, що вони успішно відображаються як на кар'єрному розвитку фахівця, так і на його особистісних рисах. Виявлено основні види м'яких навичок, а також описано їх сутність.

Висновки. Дослідження довело, що формування даного виду навичок у студентів є необхідною умовою під час організації сучасного освітнього процесу в Міжнародному казахсько-турецькому університеті імені Ахмета Яссаві. Практичне значення отриманих у ході наукового дослідження результатів полягає в тому, що вони можуть бути використані при розробці навчальних планів і програм для підготовки майбутніх ІТ-фахівців.

Ключові слова: індустрія 4.0; програмування; професійна підготовка; додаткова освіта; комунікація.