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Methodology for Developing Soft Skills of Future Computer Teachers

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Abstract: This article deeply covers the role of soft skills, i.e. effective methodology for developing soft skills in future computer science teachers, modern pedagogical technologies, interactive educational methods and project-practical tasks. The study emphasizes the importance of soft skills such as communication, creative and critical thinking, cooperation and leadership in increasing the professional and personal potential of computer science teachers. Also, the consistent and stable formation of soft skills in students as a result of the gradual introduction of interactive methods, project tasks and digital technologies in the modern educational process is substantiated using practical examples and graphic materials. The methodological recommendations presented in the article are of significant theoretical and practical importance in the professional development of computer science teachers.

Keywords: Soft skills, modern pedagogical technologies, interactive methods, project tasks, practical tasks, communication, creative thinking, digital education, professional development.

Introduction:

Nowadays, for competitiveness and success in all spheres of society, in particular in the education system, the importance of not only deep theoretical knowledge, but also a wide range of personal and professional skills - soft skills - is increasing. It is precisely for the field of informatics that mastering modern technologies, solving innovative problems and quickly exchanging information is not enough, effective communication, creative and critical thinking, teamwork, time management, leadership and other soft skills have become important professional criteria for every teacher. The formation of these soft skills in future informatics teachers is carried out through the widespread introduction of modern pedagogical technologies and interactive methods into the educational process[1].

Today, project and practical assignments, group and individual training, case studies, role-playing games, interactive discussions, and work through digital platforms are showing their high effectiveness in forming not only professional, but also personal competencies in informatics teachers. This article deeply analyzes the practical possibilities of using modern pedagogical technologies in developing soft skills of informatics teachers, the role of interactive methods, and the mechanisms of project and practical assignments. The approaches presented in the article create the basis for the formation of informatics teachers as competitive specialists in the future, both professionally and in terms of personal development.

In the educational process, various pedagogical technologies are used in a comprehensive manner to form soft skills of computer science teachers, that is, communicative, creative, critical, cooperative and leadership skills. First of all, interactive methods are distinguished by their effectiveness. For example, with the help of role-playing games, students play their professional roles as a trainer or programmer. In this process, they practice skills such as making quick and correct decisions in complex situations, interacting with colleagues, quickly identifying and solving problems, and engaging the audience[2].

Case study technology is also one of the most convenient and effective methods for developing soft skills in computer science. Case study (case study) -

that is, the analysis of real-life or artificially created situations - teaches students to make independent decisions, think analytically and critically, as well as work in a team. In this method, the computer science teacher divides students into small groups and presents each group with a specific problem or issue. Group members analyze the situation together, approach the problem from different perspectives, and develop the most optimal solution. In this process, each participant develops communicative and collaborative skills, such as expressing their opinion openly and reasonably, listening to the points of view of others, analyzing and discussing ideas, and coming to a final decision.

Debate and brainstorming techniques also serve to develop soft skills in modern computer science classes, especially communication and creativity, as well as skills such as flexibility. In debates, students learn how to defend their point of view based on arguments, provide evidence, respond to the opponent's opinion in a cultural and reasonable way, and learn how to correctly exit constructive criticism and disputes. Brainstorming is an effective tool for finding new ideas, innovative solutions, and exploring non-traditional approaches, and it enhances creative thinking and openness to innovation in computer science teachers.

Project-based learning technology is one of the most effective approaches to developing soft skills, especially in professions related to information and communication technologies. Based on this technology, students carry out practical work on their own independent or team projects - for example, creating a software product, developing an algorithm, designing a database, creating a website. In this process, they acquire the skills of distributing tasks within their role, managing time properly, helping each other, presenting and discussing results, critical thinking and evaluation. In the project-based approach, the teacher participates not only as a source of knowledge, but also as a mentor and guide, which creates the basis for increasing independence and leadership potential.

Digital and virtual learning technologies are becoming an integral part of developing soft skills today. Group online projects, discussions, training and simulations can be organized through distance learning platforms (Google Classroom, Moodle, Zoom, MS Teams, etc.). In remote working conditions, students learn to work collaboratively through virtual groups, effectively use online communication tools, prepare presentations, express their thoughts concisely and clearly, and correctly accept online debates and criticism. Special emotional intelligence development programs (for example, online trainings, self-reflection techniques, webinars on stress management) also increase the skills of balance and self-control in computer science teachers, as well as the ability to correctly approach the emotions of other people[3].

The table clearly shows which soft skills of computer science teachers are influenced by the formation and development of various modern pedagogical technologies (Table 1):

Modern pedagogical technology	Main areas of soft skills development	A practical example
Interactive methods (role-playing games, case studies, discussions)	Communication, critical thinking, creativity, empathy	Problem-solving as a team through a case study
Project-based learning	Collaboration, leadership, time management, responsibility	Group project on creating a web application
Practical tasks	Independence, creative approach, stress resistance	Individual software projects
Digital platforms	Flexibility, self-control, quick thinking	Online group presentations

Table 1. The relationship between modern pedagogical technologies and types of soft skills

Blended learning is a combination of traditional and modern technologies, which allows for the effective combination of individual and group teaching, independent and mutual learning, offline and online methods. In this model, computer science teachers participate not only as teachers-interpreters, but also as assistants, evaluators and consultants in problem situations. In the conditions of blended learning, students develop soft skills aimed at testing their knowledge in practice, self-assessment, reflection and self-development.

If we turn to foreign experience, in developed countries - the USA, Great Britain, Finland and Singapore - special training courses, mentoring programs, interactive seminars and webinars have been introduced to develop soft skills in the field of informatics and IT. There, using modern technologies, through trainings close to real-life and professional situations, hackathons and startup projects, students develop creative, communicative and leadership skills. Such approaches can also be adapted to the national education system and help train informatics teachers as highly qualified specialists who meet modern professional requirements[4].

Also, the share of the main modern pedagogical approaches that influence the formation of soft skills of computer science teachers is reflected in the following diagram (Figure 1):

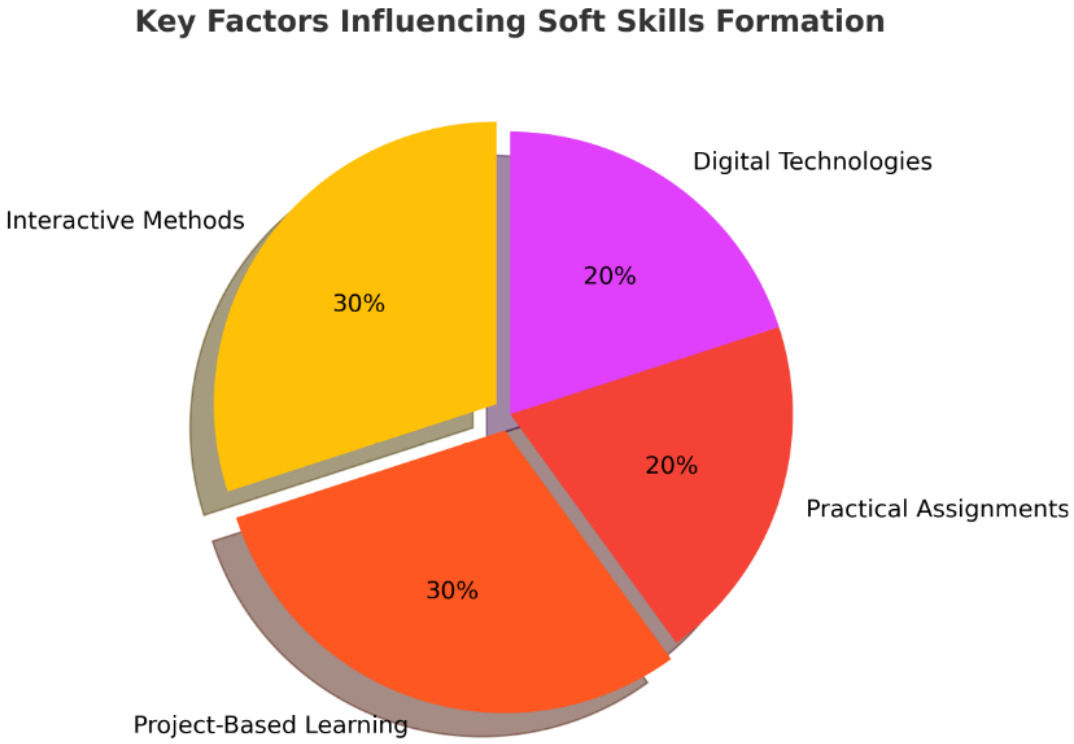

Figure 1. Distribution of the main factors influencing the formation of soft skills in computer science teachers.

The combination of modern pedagogical technologies and innovative approaches in the development of soft skills serves to perfectly form not only the professional, but also the personal qualities of computer science teachers. Such skills, in turn, guarantee their effective work in the future, rapid adaptation to an advanced technological environment, and the formation of competitive personnel.

The importance of interactive teaching methods in modern education is increasing year by year. In particular, in the training of computer science teachers, interactive methods are showing their effectiveness in developing not only theoretical knowledge and technical competencies, but also soft skills - that is, soft skills such as communicative, creative, collaborative and leadership. The main advantage of interactive methods is that they put the

student at the center of the learning process, encourage him to be active and turn each participant into a full-fledged member of the process. For example, through role-playing games, students simulate situations that they may encounter in real life and perform various professional roles and functions, while naturally developing communication, problem-solving, quick and correct decision-making, social adaptation and leadership skills[5-7].

Using case-study technology, the teacher exposes students to real problem situations and guides them to analyze and find solutions together. In this process, each student acquires the skills of independently expressing his or her own opinion, approaching the problem from different perspectives, listening to each other's opinions, and discussing them constructively. This is especially true in practical tasks in the field of computer science - identifying errors in software code, optimizing a project, or developing a new algorithm. In such problem situations, through teamwork, open communication, and collaborative work, students acquire important soft skills that are relevant to real life[8].

Another important aspect of interactive training is manifested in the methods of discussion and group work. In the process of group work, each student feels responsible within the framework of the role assigned to him, openly expresses his opinion, listens to and responds to others, values the diversity of opinions, understands social responsibility, and learns to cooperate constructively in achieving results. These experiences provide significant assistance to computer science teachers in a real professional environment - for example, working in a project team, guiding students, organizing social projects and initiatives[9].

Currently, interactive methods are being implemented in tandem with innovative approaches specific to the field of computer science. For example, online training, interactive seminars, virtual laboratories, and remote project activities form not only the technological literacy of computer science teachers, but also their communicative and collaborative skills at a high level. In an online environment, a student acquires skills such as independent knowledge search, remote teamwork, concise and clear expression of his thoughts, self-evaluation and evaluation of others, stress tolerance, and proper time management.

At the same time, another useful aspect of interactive methods for computer science teachers is that they help develop a creative approach and critical thinking. “Brainstorming”, “syncwine”, concept mapping, SWOT analysis and other methods form the skills of teachers to put forward new and effective ideas, find alternative solutions, and take a creative and analytical approach to their work. This is very important for modern computer science lessons, because at a time when technologies are rapidly changing, it is necessary to always be innovative and flexible[10].

The effective use of interactive teaching methods has a strong impact on the thorough and sustainable formation of modern soft skills in computer science teachers. Because through these methods, the teacher involves students in practical activities, encourages them to work on themselves, openly exchange ideas, be socially active, cooperate and lead. As a result, future computer science teachers are formed not only as professionally knowledgeable, but also as communicative, flexible and leading specialists who can work effectively in any professional environment.

In the modern professional activity of computer science teachers, not only exact scientific knowledge, but also solid soft skills - namely, communicative, creative, collaborative, critical thinking, time management and leadership skills - are of great importance. Therefore, the introduction of project and practical tasks into the educational process is considered one of the most effective mechanisms today. The main advantage of project-based education is that each student or group is engaged in solving a real problem or creating a product for a certain period of time. For example, computer science teachers who participate in tasks such as software development, website creation, mobile application development, database design, algorithm development, while consolidating their knowledge in practice, also develop skills such as communication, leadership, teamwork, problem solving and a creative approach[11].

One of the advantages of project assignments is that each participant feels their role and responsibility, actively participates in defending their point of view in the group, approaching the problem from different angles and making decisions. This process leads to the formation of soft skills such as communication and exchange of ideas in a team environment, reaching compromises and conducting disputes in a civilized manner. Participants, faced with practical problems such as various conflicts, time constraints, and proper allocation of resources in project activities, learn to independently manage stress, find creative solutions to problems, make decisions, and effectively present the result.

Another effective mechanism for practical assignments is the development of independent small projects in individuals or small groups and their presentation in public. Through this, participants deepen their skills in clearly and well-foundedly expressing their opinions, answering questions, and communicating with the audience. During the presentation process, teachers increase their self-confidence, learn to be open to feedback, develop critical thinking, and respond effectively. In this way, project and practical assignments serve as a foundation for the development of teachers' broader professional and personal competencies, not only in the field of science[12].

The level of modern soft skills of computer science teachers is significantly increased by the gradual introduction of various pedagogical approaches and innovative methods into the educational process. At the initial stage, the level of soft skills in students is quite low, since they mainly rely on traditional teaching methods and do not have sufficient experience in skills such as independent thinking, communication, collaboration or creative approach.

At the next stage, when interactive teaching methods (role-playing, case studies, discussions and group work) are introduced into the educational process, students actively participate in soft skills and begin to develop effective communication, critical and creative thinking, social responsibility and cooperation skills.

In the third stage, as a result of the widespread introduction of project assignments, computer science teachers will strengthen the necessary soft skills such as working on real problems, collaborating in a group, presenting results in public, managing stress, and making quick decisions. In the final stage, as a result of practical assignments and the full integration of digital technologies into the learning process, the level of soft skills of students will increase to a high level through independence, flexibility, effective use of modern technologies, and rapid information exchange[13].

The following graph clearly shows the gradual increase in the development of soft skills among computer science teachers (Figure 2):

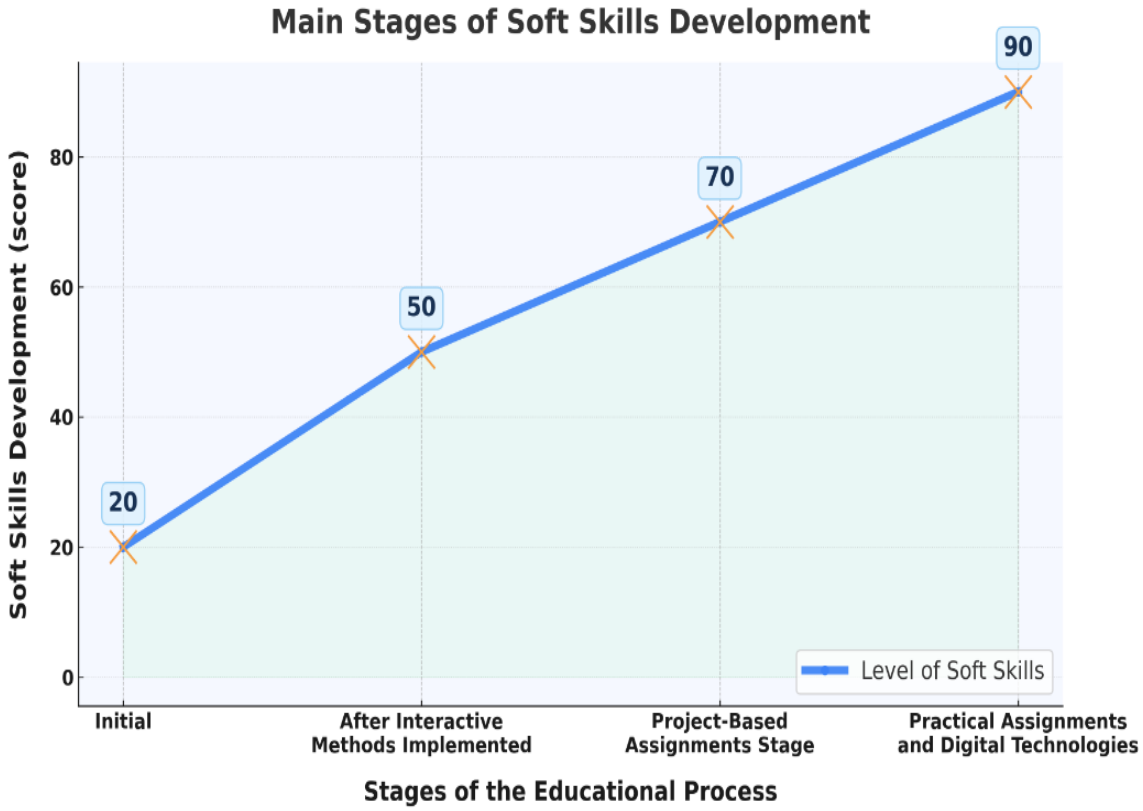

Figure 2. The main stages of soft skills development in the educational process.

In addition, competitions and practical seminars such as “hackathon”, “startup week”, “innovation marathon”, organized on the basis of a project approach, serve as an important factor in further developing the soft skills of computer science teachers. As a result of such activities, participants enter into healthy competition with each other, strengthen their skills in making effective decisions, solving creative problems and promoting new ideas in a short time. At the same time, in a modern

educational environment, organizing online projects, virtual collaboration and remote assignments through digital platforms, information exchange and group tasks are also important mechanisms for computer science teachers.

The widespread use of project and practical assignments in the educational process is one of the most effective and innovative methods for the formation and development of modern soft skills in computer science teachers. Through this approach, teachers develop not only as experts in their field, but also as leaders, creative, responsible and flexible individuals in the team.

CONCLUSION

In conclusion, the development of soft skills in future computer science teachers has become a priority of the modern educational process. Analysis shows that as a result of interactive methods, project and practical tasks, as well as the effective use of digital technologies, computer science teachers are formed as comprehensively mature and competitive specialists in professional and personal terms. Systematic development of soft skills ensures not only the professional potential of teachers, but also their personal development. This approach increases the adaptability of computer science teachers to modern requirements and the environment and brings the quality of education to a new level[14].

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