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### **SOFT SKILL IN IT STUDENTS TRAINING**

*Abstract:* The article is devoted to developing soft skills for IT professionals in the process of remote learning through the introduction of team tasks using communication skills, report and presentation skills, teamwork, leadership skills, and activities under conditions of uncertainty. The experiment conducted within the framework of the study will allow us to scale the proposed methodology in the training of IT specialists in various universities.

This article aims to introduce a methodology for teaching professional disciplines using the method for developing soft skills for future IT specialists.

A method of teaching that helps students in a distance format, in addition to professional skills, also develops communication skills, presentation and report preparation skills, teamwork skills, emotional intelligence, and critical thinking.

*Keywords:* flipped classroom, IT specialists, learning formats, online learning, remote education, soft skills, quality of education.

#### **Problem statement**

The COVID-19 pandemic and the full-scale invasion have further expanded the practice IT specialists training in Ukrainian universities in a remote format using online technologies. Over 70% of higher education institutions started the academic year 2023/2024 in a mixed or fully remote format. Such learning opportunities lead to a decrease in student motivation, suppression of communication skills, lack of teamwork skills, and general educational gaps in developing soft skills, which are critical for future IT professionals. Changing traditional teaching approaches and introducing the latest tools into the educational process is necessary to reduce gaps and solve the problems described above.

In 2022-2023, the State Service of Education Quality of Ukraine organized and conducted ten monitoring studies in professional pre-university and higher education through online surveys and desk research involving over 50,000 respondents from more than 250 educational institutions. This research studied the fundamental aspects of the educational process organization in universities under martial law: quality, safety, and resources. This study used the results of a survey for the third quarter of 2023, which is nationwide, but, unlike the previous two surveys, did not contain restrictions on the number of educational institutions and respondents. According to the study, at the beginning of the 2022/2023 academic year (September 2022), more than a third of the country's professional pre-university and higher education institutions (38.5%) provided online education, 42.2% – in a mixed format, and every fifth educational institution (19.3%) – in class (in person). In the

second half of the 2022/2023 academic year (March, June 2023), most institutions operated in mixed (on-site) (53%) and distance (29%) formats. Almost every fifth institution (18%) used the on-site format (Fig. 1) [1, 2].

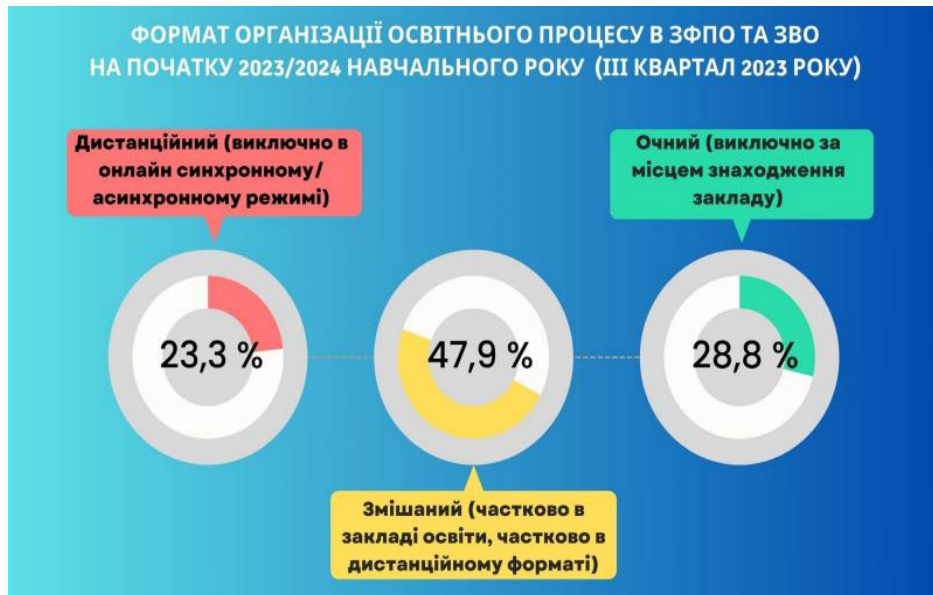


Fig. 1. The format of educational organization in VET and HEIs [2]

When asked whether the survey participants were satisfied with the format of the educational process in the current way of life, over two-thirds of them (86.6%) answered in the affirmative, regardless of the format chosen by the institution (Fig. 2) [2].

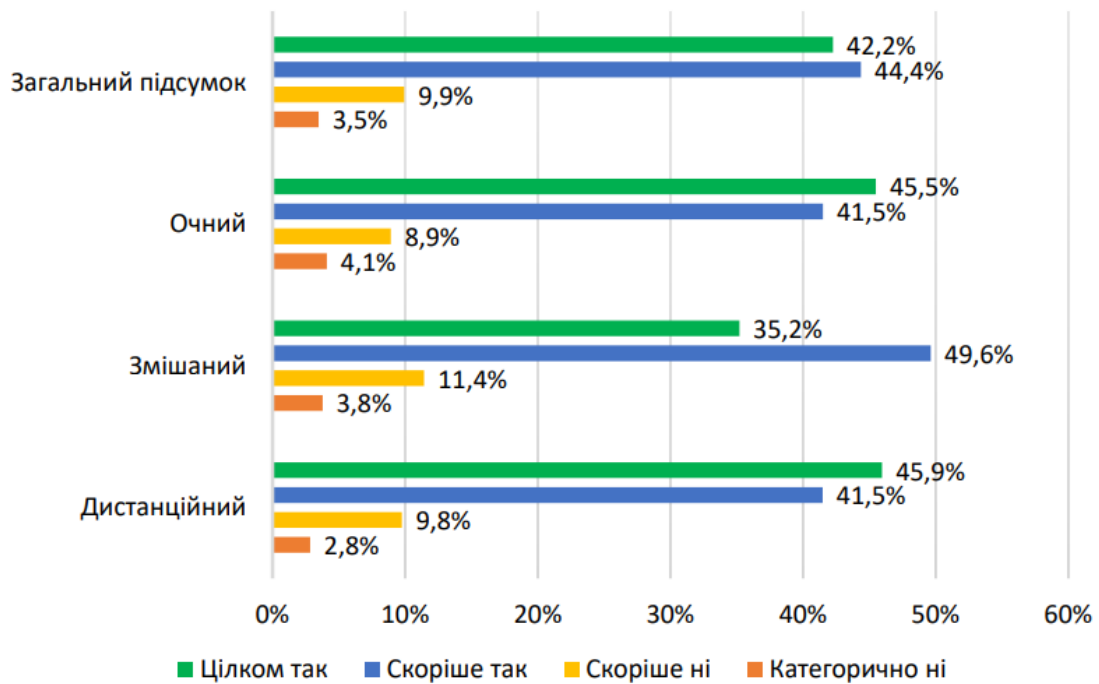


Fig. 2. Satisfaction with the educational process format [2]

The top 5 essential factors that respondents believe may be a reason to use face-to-face and blended learning formats are as follows (Fig. 3).



Fig. 3. Reasons for choosing in person and mixed formats [2]

Based on the responses received from the State Service of Education Quality of Ukraine, a rating of critical factors was compiled, in the presence of which, according to the survey participants, an educational institution may decide to use a remote learning format (Fig. 4).



Fig. 4. Reasons for choosing a remote format [2]

At the same time, the pandemic and the full-scale invasion have led to significant educational losses among higher education students. The analysis of the responses also revealed a specific dependence of educational losses on the duration of the forced interruption of education during the war. Thus, the problem of educational losses was more acute in educational institutions that suspended studies for a long time (Fig. 5).

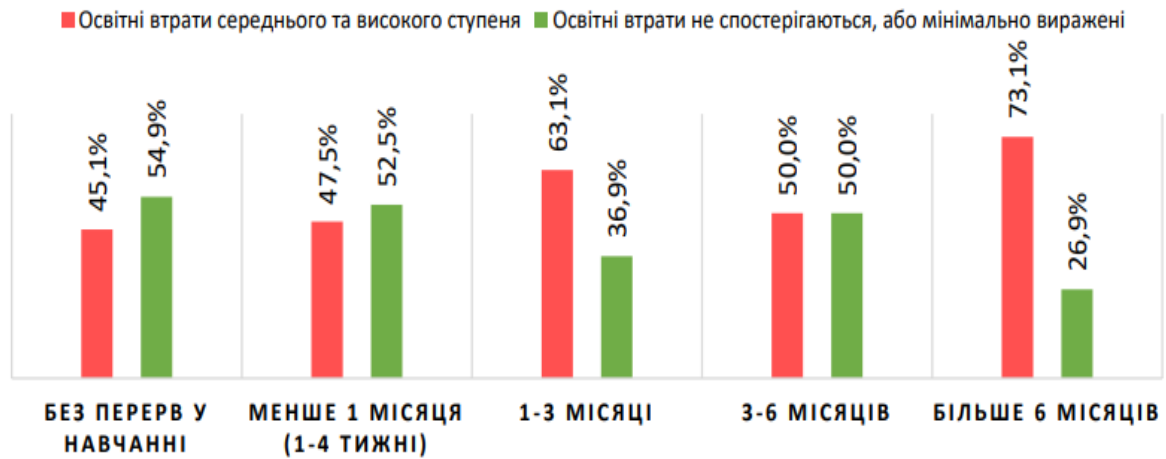


Fig. 5. The overall level of educational losses in educational institutions (teachers' opinion) [2]

The most common problem, according to teachers, that educational institutions had to face when resuming the educational process after a forced break was a significant level of emotional stress on both students and teachers, which negatively affected the overall psycho-emotional background and, accordingly, affected academic and work performance (Fig. 6).



Fig. 6. Problems that arose in the process of resuming the educational process after the forced break (teachers' opinion) [2]

Accordingly, this has led to a decrease in the quality of learning new material, a decrease in motivation, and an acceleration of learning, which in turn has led to a reduction of attention to soft skills or a complete lack of their development, which is considered a critical component for most professions, including IT professionals.

As part of the study, an educational experiment was conducted with the involvement of future IT professionals, 191 students of the Faculty of Informatics and Computer Science of the National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute” who took part in the implementation of the soft skills model as part of the study of professional educational components.

Soft skills include critical thinking, problem-solving, public speaking, professional writing, teamwork, digital literacy, leadership, professional attitude, work ethic, career management, and intercultural fluency. This contrasts hard skills, which are specific to individual professions [3, 4].

Soft skills are among the critical skills for an IT professional. First, it is necessary to develop practical communication skills: IT professionals often work in teams and must express their thoughts clearly and concisely so that each team member understands their role. IT projects require a comprehensive ability to collaborate and share knowledge and ideas [5, 6].

Emotional intelligence plays a vital role in such work. IT professionals work with people, and they need to understand their own and others' emotions to manage their feelings and build empathetic relationships [7]. IT professionals often become project leaders, and they need to be able to motivate and inspire others, delegate tasks, and take responsibility. At the same time, IT professionals should be able to analyze information, justify their opinions, and make logical decisions, i.e., use critical thinking and develop emotional intelligence. The IT industry is developing rapidly, so IT professionals need to be flexible, learn new things, and be open to new ideas [8].

### **Methods of soft skills development for the future IT specialists**

A teaching methodology based on the flipped classroom model [9] was proposed to improve future IT specialists' soft skills. As part of the mastery of two disciplines, “Architecture of Computer Systems” and “Systems Theory and Systems Analysis,” in the third year of study in the specialty 126 Information Systems and Technologies, students prepared lecture material (reports and presentations) for further presentation during the course. The experiment involved 191 students. The experiment lasted for an academic semester.

Students were divided into teams of 9 to 13 people to implement the method. Each team received a unique topic based on the course materials. For each topic, a team of teachers developed a detailed list of questions corresponding to the goal. After working through the material provided, students had to prepare a report within 30-40 minutes and a presentation to accompany it. During their work, the students had the opportunity to practice all the necessary

soft skills: communication, teamwork, organization, ability to solve complex issues and conflict situations, leadership, critical thinking, and emotional intelligence. However, first and foremost, they acquired knowledge and skills in the disciplines and enabled their fellow students to acquire such knowledge and skills.

Before the start, the students received instructions from the lecturer on the assignment, evaluation, and requirements for reports and presentations. Separately, the students were given a lecture on preparing reports and presentations. The requirements for presentations as part of the grading system were additionally sent to the students. An essential component of practical evaluation and encouragement of students was their participation in analyzing the work of their classmates and determining the points for reports and visualizations, which influenced the final grade of the assignment in the ratio of 50% of the grade – the teacher's grade and 50% of the grade – the classmates' grade.

The preparatory period lasted a month. As part of the preparatory work, students could ask the lecturer questions to clarify unclear aspects, but all teamwork issues were resolved independently.

During the presentations, students had to additionally engage the audience in the material presented, as the educational process took place in a remote format, which reduced the attention and concentration of the audience and deprived them of emotional connection, direct eye contact, etc. Also, the speeches were interrupted by air raid alarms, sometimes by the absence of electricity and the Internet. All this increases stress and forces students to find ways to solve such problems, which develops creative thinking.

Based on the results of the course, a survey was conducted among 29 respondents. The study shows 51.7% are delighted with the course (Fig. 7).



Fig. 7. Satisfaction with studying the discipline

44.8% rate the quality of the acquired soft skills at ten on a ten-point scale, with 79.3% emphasizing teamwork, 55.2% – on choosing the method of presentation, 48.3% – on mastering the creation of presentations, 55.2% – mastering the preparation of reports (Fig. 8, 9).

Оцініть від 1 до 10, де 10 - найвищий показник, а 1 - найнижчий отримані soft skills?  
29 відповідей

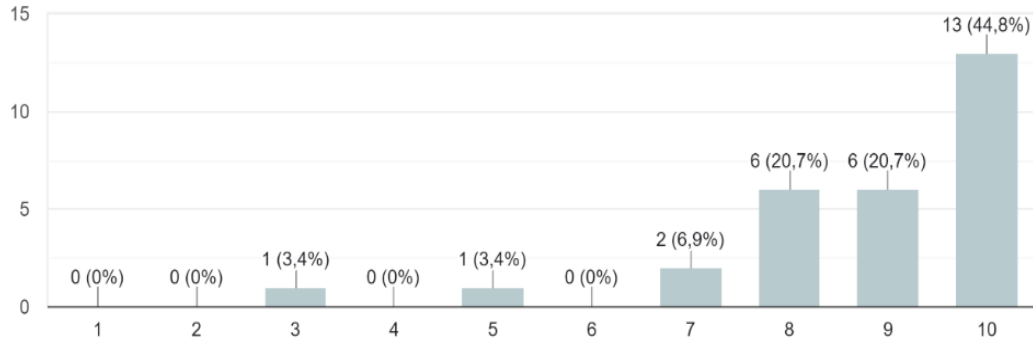


Fig. 8. Soft skills acquisition rate

Що сподобалось найбільше під час виконання такої форми завдання?  
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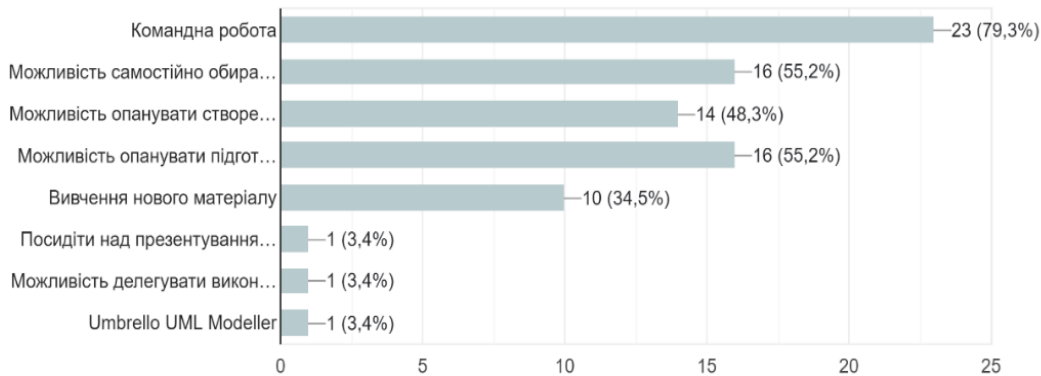


Fig. 9. Satisfaction with the forms of task execution

Among the disadvantages, students identified a large amount of material that needed to be processed and a need for more motivation among other team members. Still, all these difficulties were eliminated in the process of working together.

It is planned to continue the experiment to consider the comments and suggestions provided to obtain better empirical results, improve the overall teaching in a distance format, and develop soft skills in future IT professionals.

### **The implementation results of the proposed method**

The study identified the following areas for developing soft skills in future information technology professionals using the proposed model.

#### 1. Effective communication:

- The ability to clearly and concisely express one's thoughts (preparation of reports, presentation of own projects).
- Active listening skills to understand and take into account the opinions of others (evaluating the work of other teams).
- Ability to give and receive constructive feedback (critique of team reports and presentations).
- Knowledge and understanding of non-verbal communication (use of non-verbal skills in preparing presentations).
- Ability to adapt the communication style to different audiences (creating reports that the target audience will understand).

#### 2. Teamwork:

- Ability to work with others to achieve common goals (joint team preparation of reports and presentations).
- Skills in delegating tasks and accepting responsibility (election of a team leader and distribution of tasks within the team).
- Ability to resolve conflicts and build constructive relationships in a team (resolving conflict situations and teamwork during the preparation of a task).
- Willingness to share knowledge and experience with others (within the team, all participants gained different experiences and shared them with colleagues, as they were jointly responsible for the project).
- Respect for diversity and inclusiveness in the team (teams were encouraged to listen to all participants' opinions and consider existing limitations).

#### 3. Problem solving:

- The ability to analyze complex situations and identify the roots of problems (various problems arose during the preparation of the task – adaptability of the material, a large number of sources, the need to distribute work and resolve conflicts, etc., the ability to solve such situations affected the success of the team during the presentation).
- Creativity and generating new ideas for solving problems (preparation of reports and presentations was based on existing knowledge and skills and a creative approach to creating reports and presentations).
- Ability to evaluate and choose the best solutions (during the preparation of presentations, students had to identify the best approaches and practices).
- Analytical thinking and decision-making skills (each part of the report and presentation required a team decision on the structure, completeness, and content).



- Independence and initiative in solving problems (during the report and presentation preparation, students did not ask the teacher about problematic issues, as they had to make their own decisions and take the initiative to solve all difficulties).

#### 4. Critical thinking:

- Ability to analyze information from various sources (during the report and presentation preparation, the entire array of sources on the topic was analyzed).

- Ability to substantiate their opinions and arguments (presentation of the material required understanding and ability to argue the statements made).

- Skills of logical thinking and informed decision-making (the report and presentation had to be built logically by the questions provided and consistently prove the authors' opinions).

- The ability to distinguish facts from opinions and manipulations (when processing the material, it was necessary to distinguish scientific material from existing pseudo-scientific research).

- Skepticism and readiness to verify information (all factual material presented in reports and presentations had to be checked in advance during preparation).

#### 5. Emotional intelligence:

- Understanding one's emotions and their impact on behavior (each team member constantly analyzed their state and its impact on teamwork).

- The ability to manage emotions in stressful situations (stressful situations accompany any teamwork, and only by learning to work under stress and uncertainty while finding ways to manage emotions can further professional success be achieved).

- Empathy and understanding of other people's emotions (preparation of reports and presentations was often accompanied by joint strategic sessions to discuss problematic, including emotional, issues).

- Skills in emotional communication and building empathetic relationships (team success is possible only with emotional communication; lack of empathy leads to rapid burnout and inability to continue working).

- Ability to create a positive atmosphere in the team (team leaders were tasked with finding effective ways to organize work, particularly by creating a positive atmosphere).

#### 6. Leadership:

- The ability to motivate and inspire others (team leaders lead by example and constantly inspire their teams to work).

- Skills in delegating tasks and accepting responsibility (team leaders distributed work and were responsible for such distribution).

- Ability to make decisions and lead the team (during difficult moments of report preparation and presentations, team leaders made decisions and interpreted them to the team for further joint processing).

- The ability to resolve conflicts and build constructive relationships in the team (leaders were responsible for resolving potential conflicts and problem situations).

- Strategic thinking and vision of development prospects (team leaders built their work strategically with explicit time limits and constant step-by-step reporting).

#### 7. Adaptability:

- Readiness for changes and new challenges (teams had to be prepared for challenges – lack of electricity, internet, air raid alert during the report, etc., none of which should have affected the readiness to report).

- The ability to learn quickly and master new skills (during preparing reports and presentations, the teams had to master and develop public speaking skills and skills in preparing visuals for the report).

- Flexibility and creativity in finding new solutions, openness to new ideas and innovations (preparing the report required finding new solutions for presenting large amounts of material by the target audience and the requirements provided by the teacher).

- Positive attitude to uncertainty and risks (in the face of uncertainty, the team had to be ready for any challenges, treat them as positively as possible, and see an additional pole – developing such skills for further implementation in work processes).

The combination of hard and soft skills makes a professional more adaptable to changes in the technological environment and contributes to a higher level of success in their career. Developing these skills can help professionals make a significant contribution to the development of innovations and further development of the country.

### **Conclusion**

The present study proposes and experimentally tests a method of developing the soft skills of IT specialists while mastering a professional discipline. Namely, students are asked to divide into teams and present reports and presentations on the discipline. During remote learning, students usually need to improve communication, leadership, teamwork skills, etc. A separate problem is the lack of visual and tactile contact and the absence of emotional connection, which worsens the motivation to learn.

The proposed method has been experimentally implemented in teaching two disciplines to third-year students majoring in specialty 126 Information Systems and Technologies. According to the results of student surveys, after mastering the disciplines, the motivation to learn has significantly increased, and soft skills, namely, effective communication, teamwork, problem-solving, critical thinking, emotional intelligence, leadership, and adaptability, have improved.

The study showed the urgent need to develop soft skills in future IT professionals, as the level of such skills has significantly decreased during the pandemic and full-scale

invasion, and this is a critical component in the training of such specialists. The proposed method should be further improved and scaled up for future IT professionals. Involving a more comprehensive range of students will improve their skills and allow for improving the proposed options.

## REFERENCES

1. The State Service of Education Quality of Ukraine. Monitoring research. URL : <https://sqe.gov.ua/diyalnist/monitoringovi-doslidzhennya/opituvannya-doslidzhennya-vivchennya-za-2023/> (access date: 01.02.2024).
2. The State Service of Education Quality of Ukraine. Information and analytical note on the organization of the educational process in professional pre-higher and higher education institutions of Ukraine under martial law (based on the results of a quarterly online survey, third quarter of 2023). URL : [https://sqe.gov.ua/wp-content/uploads/2023/11/IAD\\_III\\_kvartal\\_2023.pdf](https://sqe.gov.ua/wp-content/uploads/2023/11/IAD_III_kvartal_2023.pdf) (access date: 01.02.2024).
3. The European Dictionary of Skills and Competences (DISCO). URL : [http://disco-tools.eu/disco2\\_portal/](http://disco-tools.eu/disco2_portal/). (access date: 01.02.2024).
4. Dictionary.com / Soft Skills. URL : <https://www.dictionary.com/browse/soft-skills> (access date: 01.02.2024).
5. Doyle, A. *Hard Skills vs. Soft Skills*. URL : <https://www.thebalance.com/hardskills-vs-soft-skills-2063780>. (access date: 01.02.2024).
6. Lippman, L.H., Ryberg R., Carney, R., Moore, K.A. Workforce connections: key “soft skills” that foster youth workforce success: toward a consensus across fields. Washington, DC: Child Trends. 2017. 56 p.
7. Robles, Marcel M. (2012). Executive Perceptions of the Top 10 Soft Skills Needed in Today’s Workplace. *Business Communication Quarterly*. № 4 (75). с. 453–465.
8. Silber, K.H. & Foshay, W.R., *Handbook of Improving Performance in the Workplace*. Volume 1. Instructional Design and Training Delivery. Pfeiffer, 2009. 800 p.
9. Tucker, B. The Flipped Classroom. *Education Next*. Winter 2012, P. 82-83 URL : [https://www.educationnext.org/wp-content/uploads/2023/04/ednext\\_XII\\_1\\_what\\_next.pdf](https://www.educationnext.org/wp-content/uploads/2023/04/ednext_XII_1_what_next.pdf) (access date: 01.02.2024)