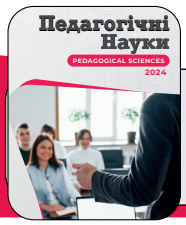

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Implementation of Scrum methodology elements in the educational process in Ukraine: New horizons for the development of communication competences

Abstract. In the context of digitalisation and technological development, modern Generation Z students, who are accustomed to online learning and digital gadgets, need innovative approaches and a favourable environment for self-development. To effectively educate this generation, teachers should focus on developing communication skills, critical thinking, creativity, and other significant competences. The purpose of this study was to test the effectiveness of using the elements of the flexible Scrum methodology as a tool for developing students' communication skills through the integration of an interdisciplinary approach. The study employed the methods of theoretical generalisation and comparison (consideration of the essence and characterisation of the differences between flexible methods), analysis (questionnaires, self-analysis of the case participants), statistical method (compilation and grouping of data to determine the percentage of satisfaction of participants), synthesis (combination of various types of information). The study analysed the studies of Ukrainian and foreign researchers on the options for using the Scrum methodology. The study described the stages of practical use of elements of the flexible Scrum methodology in the educational process, with each of the proposed stages substantiated. The statistics of responses to the survey of second- and fourth-year students to understand the effectiveness of teamwork during an interdisciplinary practical training were presented. A pedagogical experiment was conducted using elements of the Scrum methodology to develop the communication competences of applicants, which enabled fourth-year students to assess their professional skills for their future profession, and second-year students to conduct a self-analysis of their level of competence and understand the areas for self-improvement. The experiment contributed to the development of key communication and self-development skills. The study developed an algorithm for using elements of the Scrum methodology in interdisciplinary practical classes. The findings of an empirical study of the development of students' communication competences using three diagnostic tools were presented. The practical value of this study lies in the possibility of implementing its findings in the educational process in the development of academic disciplines for various courses of higher education

Keywords: interdisciplinary case; teamwork; sprint; product owner; facilitator; retrospective

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INTRODUCTION

Understanding the significance of using interactive teaching methods that involve active engagement of students, teachers try to find special approaches to each student, because each student has their individual interests, learning style, perception, and assimilation of educational material, and therefore it is vital to provide tailored support. This leads to the search for modern practical teaching methods to develop not only theoretical skills but also practical ones. Such a methodology may be the Scrum methodology, which is predominantly used in EU countries. Therefore, it is vital to update the existing educational model with an emphasis on developing future-oriented competences.

It is widely known that the higher education system needs constant transformation. Various researchers have addressed this issue. Thus, V.V. Sychenko *et al.* (2022) proved that project management, specifically the use of agile methodologies, is a relevant tool for reforming the higher education system in Ukraine. This will enable more efficient implementation of educational projects and adaptation to changes in the external environment. Sharing concerns regarding the development of the necessary skills for students to work successfully in a dynamic world, L.V. Slipchyshyn (2020) noted that the Agile approach is an effective tool for modern education. S.G. Kisno *et al*. (2022) shared this opinion, emphasising that the Agile approach can be effective for active and project-based learning, enabling students to take an active part in the learning process. Furthermore, Agile methods can be applied to various subject areas, not just software engineering. The findings of the study revealed a considerable interest in investigating and applying flexible approaches to teaching to stimulate collaboration and effective student performance.

When considering the evaluation of the Scrum method in Brazilian federal universities, E. Rodrigues de Oliveira *et al*. (2023) indicated that despite some limitations, such as low level of technical maturity and high staff turnover, most of the surveyed employees positively assessed the use of Scrum. M.V. Kryva & A.-M.V. Lysko (2024) saw the great potential of introducing EduScrum in the educational process. It was proved that the use of the EduScrum methodology will increase students' involvement in the implementation of tasks, help them develop self-organisation and cooperation skills. S. Fernandes *et al.* (2021) investigated the potential of using Scrum to improve the efficiency and quality of project-based learning. The findings showed that using Scrum in project-based learning teams can greatly improve project and team management. The researchers identified the key benefits of Scrum for PBL teams: efficient task allocation, performance monitoring, visual management, and regular feedback. V. Pryimak & B. Korzh (2019) pointed out that agile methodologies such as Scrum and Kanban are more effective than conventional cascade models in engineering. Their application enables adaptability to change, improvement of team communication, and enhancement of the quality of the final product.

The purpose of the present study was to test the application of elements of the flexible Scrum methodology to develop students' communication competences using an interdisciplinary approach. To fulfil this purpose, the following tasks were set:

1. To substantiate the necessity of applying the elements of the Scrum methodology as a pedagogical methodology for conducting interdisciplinary practical training for second- and fourth-year students.

2. To use three methods of empirical research to assess the development of students' communication competences after the experiment.

3. To present the findings of an empirical study of the development of communication skills of management trainees through the application of elements of the Scrum methodology in the educational process.

LITERATURE REVIEW

The issue of applying the Scrum methodology, especially in the educational process, stays relevant to this day. Many researchers refer to this methodology and offer various options for its use. Yu.I. Minhalova (2018) considered current trends in the organisation of research activities of students of higher education institutions, outlined ways to solve the problem associated with the stereotypical thinking about the organisation of students' research work only in extracurricular time. The researcher pointed out that Scrum is a kind of work environment with flexible project management. Much is left to the discretion of the project team. And this is implemented for the simple reason that it is the project team that knows the best ways to solve problems that arise. Yu.I. Minhalova (2018) noted that research using agile Scrum management enables students to engage in scientific research, which contributes to the development of the necessary abilities of a modern researcher.

V.V. Sychenko *et al.* (2022) looked for the best ways to apply project management approaches in the higher education management system in Ukraine in the context of rapid socio-political changes, provided recommendations for the application of modern flexible management methodologies. Based on the analysis of the essence of the project-based approach, the researchers proposed ways to improve management mechanisms in the higher education system, involve state and regional authorities, business communities, and NGOs as customers of educational projects. The researchers focused on the need to adapt the project management methodology to the theory of public administration to ensure the innovative development of the higher education system as a whole, identified and analysed the key aspects to be considered when implementing project management models, improved the educational mechanism for implementing the project management methodology, considering the principles of systematicity, consistency in planning, organisation, execution, control, tracking progress and success dynamics, applying management decisions according to concrete

conditions, the ability to quickly adapt to new socio-economic conditions, and also considered in detail the stages of the project life cycle.

L.V. Slipchyshyn (2020) investigated the need to use an agile approach in education. The researcher found that the "information noise" in the educational process is overcome by fundamentalisation, which provides the scientific core of the educational material, around which the content is formed, factoring in the new skills and sources of learning. The researcher showed that to solve the educational problems in many countries of the world, the Agile approach is employed, which aims to help individuals gain knowledge through experience, facilitate the transition from conventional linear problem solving to iterative and group problem solving, which focuses on the abilities and skills of individuals and the significance of using them to benefit group processes. The ability to master the content of learning based on iteration is formed using the mechanisms of imaginative thinking and reflective activity, which will enable the training of competitive specialists.

M.V. Kryva & A.-M.V. Lysko (2024) identified the features of the implementation of the eduScrum methodology in the educational process of higher education institutions and investigated the attitude of students towards its use in organising project activities. The advantages of using flexible technologies in education, the disadvantages and difficulties of using eduScrum were considered, the need to prepare participants in the educational process for its wider application in the educational process, and the use of digital services for working with a scrum board were emphasised. In the study, the researchers substantiated the need to introduce the eduScrum methodology into the educational process of higher education institutions and proved that the introduction of the eduScrum methodology is a promising area of research, since this methodology in higher education institutions can be used in full-time, blended, and distance learning; adapted to the study of various academic disciplines.

A. Jurado-Navas & R. Munoz-Luna (2017) investigated the application of the Scrum methodology in teaching English at the University of Malaga. The findings revealed that this approach is effective and valuable for modern universities. Students were initially reluctant and apprehensive about working in teams, but with practice, their opinion changed. For instance, they positively noted that this methodology encouraged them to participate and change ideas with a deeper sense of empathy, self-organisation, and self-discovery. At the end of the training, most students said they would take part in an analogous event again. Thus, considering the opinions of students (as well as teachers), the researchers concluded that this method can be viewed as a good proposal for achieving high-quality educational process in universities for three key reasons: first, it improves the ability to use knowledge in a disciplined, critical, and creative way; second, it promotes coexistence in heterogeneous human groups; third, it develops the ability to think, live, and act with full autonomy.

S.G. Kisno *et al.* (2022) emphasised that the world of education is experiencing rapid change and uncertainty, which requires adaptability and flexibility from participants in the educational process. Scrum, as one of the agile development methods, offers the principles of transparency, inspection, and adaptation that can be applied in educational leadership to effectively manage change and solve complex problems. S. Fernandes *et al.* (2021) investigated the effectiveness of using Scrum to improve the performance of project-based learning (PBL) teams. The researchers showed that Scrum helps students develop crucial skills in project management, team management, leadership, time management, etc. Students are satisfied with using Scrum, especially because of the regular feedback and visual project management. The role of the Scrum Masters is critical to the successful use of Scrum, as they help teams stay on track.

E. Rodrigues de Oliveira *et al.* (2023) proved that Scrum promotes effective interaction between team members, which is crucial for projects carried out at universities. Thanks to Scrum, teams become more productive and can achieve their goals faster. Scrum helps to develop essential skills such as project management, leadership, and problem solving. The researchers proposed a set of attributes to measure Scrum effectiveness. This set can be useful for universities that plan to implement or are already using Scrum. M. Medrek (2018) demonstrated the effectiveness of using Agile methods for teaching e-business in a dynamic and interactive environment. The researcher noted that students get access to the necessary tools and platforms for developing and evaluating e-commerce solutions, can gain practical experience in applying Agile and Scrum to develop prototypes of e-commerce systems in collaboration with potential customers.

The analysis of scientific research revealed that Ukrainian and foreign authors have paid sufficient attention to the use of the Scrum methodology in education and research, but less so to the direct didactic and pedagogical developments in the disciplines for managers. The study considered the necessity of applying Scrum in students' research work, developing soft skills, increasing the transparency of the educational process and its organisation.

MATERIALS AND METHODS

The Department of Management of Alfred Nobel University (Dnipro), in implementing the educational and professional programme "Management" of the first (bachelor's) level of higher education, conducted a pedagogical experiment in the form of an interdisciplinary approach by introducing into the practical classes of second- and fourth-year students general cases in the disciplines "Business and Taxes" (taught in the 2nd year) and "Evaluation of the functioning of the enterprise" (taught in the 4th year) to solve interdisciplinary practical problems using elements of the The purpose of the proposed case was to develop students' communication competences, practical application of theoretical material, and to teach students to assess the

financial implications of various management decisions, such as optimisation of the payroll and changes in the number of staff. The interdisciplinary approach allowed the students to integrate knowledge from multiple disciplines, develop skills in making informed management decisions based on calculations, forecasting financial outcomes, and risk assessment.

To conduct the planned experimental event, the study used an auditorium with multimedia equipment with a large projection screen, which showed presentation materials about the course of the class; a magnetic marker flipchart for attaching coloured marker sheets with the relevant conclusions after the next sprint; and small tables on wheels, from which 8 tables were created as "islands" (1 for product owners, 1 for Scrum masters, 6 for teams). A fresh bouquet of yellow flowers with a pleasant aroma was used to create a positive atmosphere. During the workshop, 6 teams were formed. The experiment was attended by 40 students, of whom 20 were second-year students and 20 were fourth-year students.

The rules for conducting a practical lesson using elements of the agile Scrum methodology in the educational process were developed, which contained 9 points. Specifically:

1. The applicants were divided into teams of 5 people – each team member acted as a manager-optimiser of the production process at TechnoBud LLC.
2. Scrum masters were selected from among the applicants – facilitators of the Scrum team.
3. The applicants were also selected from among the product owners who decided to invest in optimising the production process at TechnoBud LLC. They gave tasks for the sprint to the Scrum master.
4. The Scrum Master passed on the task received from the product owner, set tasks to their team, and worked with them for 10 minutes to complete the task. Subsequently, the Scrum master demonstrated the decision made by the team during the sprint (2 minutes) to the product owner.
5. The deadline for one sprint was set at 10 minutes.
6. Sprint retrospective (2 min) – discussing how the team worked during the sprint and finding ways to improve the quality of its work in the future.
7. After presenting the outcomes of the production process optimisation, each team received the corresponding points, considering the labour impact factor as decided by the Scrum master.
8. Teachers are facilitators of the educational process.
9. Summarising the results of the interdisciplinary case.

The following *handouts* were prepared for the interdisciplinary case: job cards, numbers, scorecards, initial data, and case objectives, options for automation elements of TechnoBud LLC, staffing table of TechnoBud LLC, initial data for calculating deductions from the payroll, functional responsibilities of the staff units of the production department and the supply and logistics department of TechnoBud LLC, questions for discussion (content of sprints). When developing the content of the sprints, the knowledge and skills acquired by the students of different courses were considered. For example, second-year students focused on calculating personal income tax and changes in tax liability and its effects on the company's operations. Fourth-year students paid more attention to process management and analysis of possible risks for the company, and their elimination upon optimising labour resources. Based on the practices of conducting interdisciplinary cases using the Scrum methodology, the study offered a vision of the stages of using Scrum elements in interdisciplinary cases. Each Stage was considered in detail and an algorithm for conducting practical classes using an interdisciplinary approach was formed.

Conducting a pedagogical experiment involved not only achieving scientific results, but also compliance with ethical standards. The participants of the experiment were informed about the purpose of the study, its procedures, and possible risks. They were entitled to refuse to take part at any time without any negative consequences. All information obtained during the experiment is kept confidential. The experiment did not cause any physical or psychological harm to the participants. All necessary measures were taken to ensure the safety of the participants. There was no deception of the participants. The experiment had potential benefits for the participants and for society as a whole. Throughout the experiment, regular assessment of compliance with all ethical standards was carried out (American Sociological Association, n.d.).

The materials used for this study included valuable sources of information that helped to consider and analyse agile methodologies and approaches used in the educational process. The first method employed was the theoretical generalisation and comparison. This method helped to consider the essence and characterise the differences between flexible methods, compare them and substantiate the need for their application. The method of analysis was employed to reveal the results of the practical training, the analysis of the questionnaire, and the self-analysis of the case participants. Based on the analysis of concrete data, more generalised theoretical provisions were formulated to explain the findings. The statistical method was employed to collate and group the data, which helped to understand and analyse the percentage of satisfaction of the participants in the event. The next method was synthesis. This method enabled a systematic review by synthesising the findings of several studies, helped to identify general trends, discrepancies, and gaps in scientific knowledge about the use of agile methods. The method of synthesis was employed to articulate the key findings and principal aspects of the study.

RESULTS AND DISCUSSION

Implementation of the elements of the Scrum methodology in an interdisciplinary practical lesson

Communication competences play a vital role in the future profession of students of the Department of Management at Alfred Nobel University (Dnipro), and therefore their development was investigated through the interdisciplinary

use of the flexible Scrum methodology. V. Varenyk & Zh. Piskova (2024) noted that the European Commission ESCO (Official website of the European Commission (n.d.) provided a classification of skills that are relevant to the EU labour market, education and training. There is an entire block of cross-cutting skills and competences that can be attributed to universal, i.e., flexible skills to some extent. The researchers emphasised that the European Commission's ESCO focuses on the skills of the Social and Communication Skills and Competences group, which relate to the ability to interact positively and productively with others. This is manifested in communicating ideas effectively and empathetically, aligning one's personal goals and actions with those of others, acting according to values, promoting the well-being and progress of others, and demonstrating leadership. It includes the following components: adherence to an ethical code of conduct, leading others, supporting others, working in teams and communities, and communicating. From the employers' standpoint, soft skills are the most significant ones for entry-level success in the workplace. According to the publication on the Official Website of Osnova Publishing Group (2020), communication competence includes the following components: sociability (the ability to establish and maintain the necessary contacts with other people); possession of meaningful information and the ability to operate with it; the ability to partner and achieve mutual understanding.

Yu.I. Minhalova (2018) concluded that Scrum can be used as an effective tool in organising students' research work. It will contribute to the development of researcher skills, increase student engagement in research activities, and enable more effective problem solving, enhancing the abilities of students. M. Medrek (2018) expressed an analogous opinion, describing the successful implementation of Scrum in a master's programme in economics and management. A. Jurado-Navas & R. Munoz-Luna (2017) pointed out that the Scrum methodology promotes a deeper understanding of the material, critical thinking, and a creative approach to learning. Working in teams helps students develop communication skills, tolerance, and mutual understanding. This method prepares students for the challenges of the real world, where they often work in teams on complex projects.

I.V. Androshchuk (2022) investigated communicative competence and found that it is an integrated property of the personality of students, which ensures the accomplishment of educational, and later, in case of vocational education, professional tasks, and includes knowledge of speech culture, the ability to understand the interlocutor, to support the conversation using verbal and non-verbal means, to convey one's opinion reasonably, interpersonal communication skills, which are crucial factors of effective interaction. Furthermore, a future specialist, and now a student of vocational education, should have flexibility and critical thinking, be able to clearly and concretely express their opinion on a particular issue, adapt in a dynamic environment, taking into account the requirements of professional activity, work with information in the performance of professional tasks, and establish interaction in a professional environment. The author emphasises the importance of communicative interaction of participants in the educational process as a special type of pedagogical communication aimed at fulfilling educational tasks through establishing a favourable psychological climate and optimising the relationships between participants in the educational process.

Zh. Bohdan *et al.* (2020) stated the low level of communicative competence of students of higher education institutions. The researchers noted that modern students have certain challenges in expressing their thoughts, which complicates mutual understanding not only between teachers and students, but also between students themselves. Considering learning as a specially organised communication, during which social experience is formed and thus assimilated, which is the content of learning, it is emphasised that the need to develop the communicative competence of students exists in the process of teaching all disciplines, since the learning process is mostly communication between the teacher and the student, interaction between them, which is a significant factor in improving the quality of the educational process.

Many researchers have considered the development of communication skills in relation to various professions. Thus, Z.M. Gomeniuk (2012) investigated their development as a condition for successful professional activity of modern managers. S.Y. Dikhtyarenko (2017) focused on the study of future psychologists' communicative competence in the educational environment of a university. To test the acquisition of communicative competences, the researcher developed methodological materials in the form of an interdisciplinary case "The impact of automation of the production process on the structure of the company's labour resources and tax liabilities on personal income tax (PIT)" for the study of PIT by second-year students and fourth-year students of the company's labour resources analysis, using elements of the agile Scrum methodology with the possibility of introducing it into the educational process of higher education institutions. It is known that Scrum is a flexible methodology that allows adapting to changes. The team can modify its approach to work depending on the concrete circumstances of the project.

The key roles in Scrum were as follows:

- product owner – represented the client's interests and was responsible for the product backlog;
- scrum master – process facilitator, helped the team to follow the scrum rules;
- development team – a self-organised team that performed the work.

Stages of using the Scrum methodology in an interdisciplinary case:

Stage 1: Product definition (case study). During this stage, it is necessary to define the product, i.e., to clearly formulate and understand what exactly the team is creating. At this stage, the product owner must provide the

Scrum Master with a clear task for the team to complete. Each team member must understand the overall purpose of the project.

Stage 2. Creation of a team. This Stage requires a clear understanding of the number of case players. A prerequisite is to keep their number to 5 people in a Scrum team. This number (5 people) is explained by the fact that it is easier to maintain effective communication in teams with a small number of members. Each team member can easily express their opinion and be heard, the probability of internal conflicts and misunderstandings is reduced, and duplication of functions is more likely to be avoided. Each team member feels responsible for the result, which helps to increase the motivation and involvement of each participant. "Uncomfortable" teams were formed by randomly selecting a number from a "magic bag" that corresponded to the team number.

In the case of this study, the role of Scrum master was given to senior students (fourth year) because they have already mastered more management skills.

Stage 3. Creating a product backlog, i.e., creating a list of all the functionalities that the product should have. In the case under study, it was a list of tasks that teachers set for students to solve during the relevant sprint.

Stage 4. Planning of sprints. A sprint is the heart of a scrum, where ideas gain value. All the work necessary to achieve the goal is done within the sprint. Since there was a time limit (1 workshop – 1 hour and 20 minutes), the allotted time was divided into four sprints. At this stage, it was necessary to select tasks, i.e., from the product backlog, one had to select tasks that the team can complete in a single sprint. Also at this stage, it was necessary to distribute tasks among team members, determine deadlines, and determine the availability of necessary resources.

Stage 5. Demonstration of results. At the end of each sprint, the Scrum master of the team demonstrated the work done to the product owner, who decided whether to invest in the product or not.

Stage 6. Retrospection. During this stage, it was necessary to discuss how the team worked during the sprint and find ways to improve the quality of work in the future. All team members analysed which tasks were performed effectively and which could be improved.

Stage 7. Analysis of the case results. This Stage is mandatory and necessary for collective discussion, where applicants independently determined which aspects of teamwork needed to be improved to achieve synergy. In-depth self-analysis is mandatory, which will allow applicants to independently assess not only the overall result, but also each step on the way to the goal, enabling them to see and understand problem areas for further development. A necessary element of the last stage, stage 7, is to receive points for the work, considering the labour impact factor as decided by the Scrum Master, which, in opinion of the authors of the present study, will increase the motivation of applicants for teamwork and determine the significance and level of responsibility of the Scrum Master. Based on the proposed stages of using the elements of the flexible Scrum methodology in an interdisciplinary case, an algorithm for using the elements of the Scrum methodology in interdisciplinary cases was developed, which is presented in Figure 1.

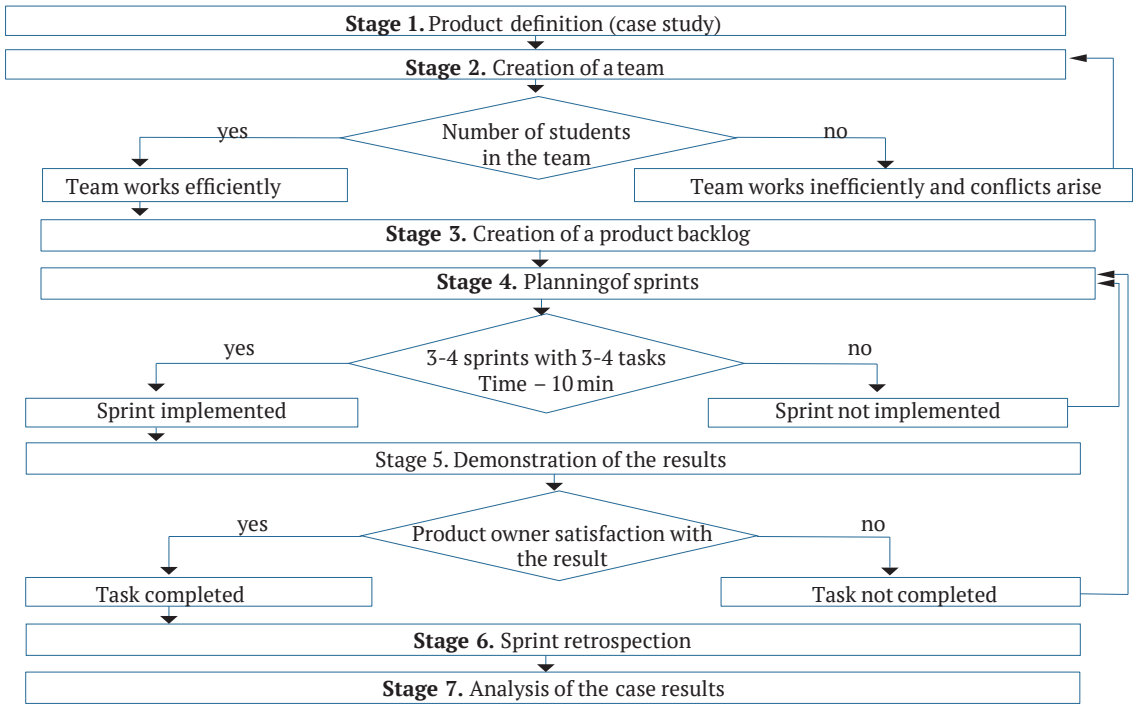

Figure 1. Algorithm for using the Scrum methodology in interdisciplinary cases

Source: developed by the authors of this study

Each group of stages has its individual semantic and logical load. The presented algorithm described in detail the process of conducting a Scrum case in a learning environment. It covers all the main stages of Scrum: from product definition to retrospection. The algorithm is logical, consistent, and adapted to the specifics of the educational process. The algorithm proposed can contribute to the development of such skills in students as ability to engage in partnerships, achieving mutual understanding, planning and organising work, teamwork, problem solving, adaptation to change, presentation of results, etc.

The teacher, as a facilitator of the educational process, can take an active part in the process, providing feedback and mentoring to the team. Furthermore, depending on the format of the training (offline or online), special digital tools can be used. If the practical training is conducted in an offline format, flashcards are developed to enable students to be more focused in their approach to solving problems. If the training is online, one can use tools such as Trello, Jira, Asana, or Miro to help students improve their digital skills. This will make it easier to plan, track progress, and communicate with team members. The resulting 3 stages of the interdisciplinary case are the final 3 stages: **Stage 5** – demonstration of results, **Stage 6** – retrospection, and **Stage 7** – analysis of the case results. By demonstrating the results at the end of each sprint (**Stage 5**), the Scrum master of each team reported to the product owner on the work done by their team. The results of the sprints in each team were quite interesting, reflecting the diversity of opinions, the level of empathy among the participants, the desire to take more or less risks, and the level of responsibility chosen. For example, one team "laid off" 30% of unskilled workers, replacing them with automated lines, while others were more loyal and only cut 6% of their staff in favour of machines.

Notably, when automating a company, one cannot completely abandon the employees of the production department, as specialists are needed to monitor the operation of machines, troubleshoot problems, organise power supply, and manage warehouse processes. These aspects became the subject of lively discussions during **Stage 6**, retrospection, where participants analysed the problems that had arisen and sought solutions. As the case study showed, there were more than enough discussion points. The results in each team were interesting, indicating the difference of opinions, the level of empathy among team members, the desire to take risks to a greater or lesser extent, and the level of responsibility chosen. For instance, one team "fired" 30% of unskilled workers and replaced them with automated lines. Other teams were more loyal to the company's staff members and replaced only 6% of people with machines. At the final stage, **Stage 7**, after the case study, the teachers conducted a survey on the results of the interdisciplinary case study, which helped to draw conclusions and analyse the responses of the case participants. The students made an in-depth self-analysis of their work and teamwork. Questions included in the questionnaire to the participants of the interdisciplinary case study:

1. How do you evaluate your work?
2. What knowledge did you lack during the case study?
3. In your opinion, how effective are interdisciplinary cases in the educational process?

Answers to the first question revealed that participants were generally satisfied with their teamwork, as presented in Figure 2

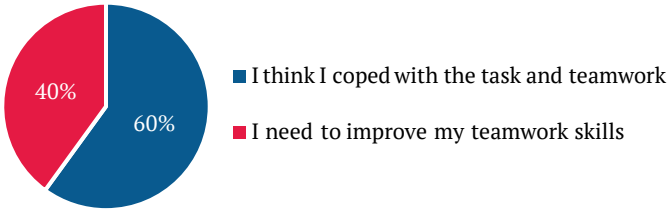

Figure 2. Results of answering the first question of the participants' questionnaire after the interdisciplinary case study
Source: developed by the authors of this study

Figure 2 shows that 60% of the participants believed that they coped with the tasks of the case, while 40% reported that they needed to improve their teamwork skills. An interesting fact was that 100% of the participants reported that they did not have enough time. This result suggests that they need to work on their time management. It may also indicate that the Scrum Masters have not correctly distributed roles among the team members. The answers to the second question of the questionnaire revealed that the participants lacked an understanding of the functional responsibilities of staff members of different departments of the company, especially the production department. Although the handout provided information on "Functional responsibilities of the staff of the production department and the supply and logistics department of the company" as a "hint". This may suggest a weak concentration of attention of the case study participants. In answering the third question of the questionnaire, the participants noted that they lacked such activities in the educational process. Thus, noting and acknowledging the complexities of the process, the participants reported that such activities enabled them to fully "engage" in the educational process, understand the significance of a "friend's" support and easily understand complex things. Another necessary element of this Stage was to assign points for the work of each team member, considering the labour impact factor. According

to the established rules, this decision was to be made by the Scrum master, which helped to increase the motivation of the participants to work together and determined the significance and level of responsibility Scrum master. This task was completed fairly, and the scores showed a true picture of what transpired in the process.

Results of an empirical study of the development of students' communicative competences after the experiment

Relying on the pedagogical practice of conducting empirical research, the study formed a diagnostic toolkit to determine the development of students' communication competences after a practical lesson using the flexible Scrum methodology. Particular attention was paid to such components of communication competences as improving sociability and increasing the ability to partner and achieve mutual understanding. Based on the empirical study of the communicative competence of students conducted by T. Shevchenko (2020), a separate diagnostic tool was considered. L.V. Plyaka & S.V. Ogar (2016) provided their view on methods for diagnosing personal and communicative qualities. S.M. Maximets (2017) investigated the communication and organisational skills of management students using the COS-2 methodology for assessing communication and organisational skills. O. Karabin & I. Vazarnytska (2005) highlighted the purpose of test control and noted that testing can provide prompt, reliable information about the readiness to perceive new material and knowledge gained in the learning process. G. Kralina (2022) investigated the role of testing in assessing the knowledge, skills, and abilities of a person. The researcher noted that testing is one of the sections of diagnostics for use in various fields, the test is considered as a standardised, short, time-limited test designed to establish quantitative and qualitative individual differences. L.K. Hrytsiuk & A.V. Liakisheva (2012) substantiated the essential characteristics of test control and identified the conditions for its effective use in the educational process of a higher education institution. A.B. Hryniak (2021) considered the specific features of the final control of law students' knowledge in the context of distance learning.

Having studied various methods, practices, and analysed the results of testing by various methods, several of them were selected and used as a basis. Thus, Thus, it is advisable to use the methodology for determining communication and organisational skills (COS-2), V. Sanzharovets & Y. Shatylo (2020), which aimed to study the communicative and organisational tendencies of the individual (ability to establish business and interpersonal relationships, desire to expand the scope of contacts, participation in public and group events, ability to influence people, desire to take initiative, etc.), which was also noted by O.M. Shelomovska (2015) in "Methodical instructions for independent work in the discipline Social Communications in Management". To test Scrum masters (fourth-year students) in their ability to draw conclusions after each sprint, the study chose the test to determine the ability to express their thoughts. The "Listening Skills" test by A.V. Kurova (2020) was also expedient, as teamwork involves the presence and development of this skill.

Thus, the experimental sample consisted of 40 second- and fourth-year management students of Alfred Nobel University aged 18-23. The study was conducted offline using Google forms. The availability of a gadget for each student allowed this to be done at the university. The following diagnostic tools were used for the empirical study:

1. Methodology for determining communication and organisational skills (COS-2);
2. Test to determine the ability to express one's thoughts;
3. Listening skills test.

The results of the study of applicants' communicative tendencies using the COS-2 methodology are presented in Table 1.

Table 1. Level of manifestation of applicants' communicative tendencies

Level of communication tendencies	Range of quantitative indicators	Assessment	Survey results, %	
			2nd year	4th year
Low	0.10-0.45	1	0	0
Below average	0.46-0.55	2	8	0
Medium	0.56-0.65	3	12	20
High	0.66-0.75	4	40	30
Very high	0.76-1.00	5	40	50

Source: calculated by the authors of this study

According to the data in Table 1, both second- and fourth-year students showed a fairly high level of communication aptitude. "High" and "very high" levels were achieved by 80% of students in both years. Half of the fourth-year students (50%) and 40% of the second-year students (40%) were characterised by quick orientation in challenging situations, relaxed behaviour in a new team, initiative, independent decision-making, and the ability to defend their personal opinions. These applicants easily adapted to an unfamiliar company and actively joined the game. However, those who did not get confused in the new situation quickly began to find friends, expanding their circle of acquaintances in the second year were more (40% – "high" level) compared to the fourth year (30%, respectively). Among the fourth-year students, there were no those who did not seek communication and felt constrained in the new company (no "low" or "below average" level). However, in the second year, 8% (below average) of applicants

had challenges establishing contacts with senior students, were afraid to speak in front of an audience and defend their opinions and were poorly oriented in unfamiliar situations. The results of the analysis also revealed that both in the second (12% – "average" level) and fourth year (20%, respectively) there are students whose potential for aptitude is not characterised by high stability. For example, they sought contact with other students, did not limit their circle of acquaintances, defended their opinions, and planned their work together with the team. However, they still need to seriously engage in the formation and development of communication skills. But it is vital to remember that the conditions for their manifestation and development may simply not have been created. Thus, fourth-year students demonstrate a greater level of development of communication skills, which suggests the effectiveness of teaching approaches and the natural improvement of competences with experience. The results of the diagnostics of the level of students' ability to listen and express their opinions are presented in Table 2.

Table 2. Students' level of listening skills and ability to express their opinions

Skills	Survey results, level, %.			Number of surveyed applicants
	Low	Medium	High	
Listening	25.0	50.0	25.0	40
Expressing thoughts	8.5	41.5	50.0	20

Source: calculated by the authors of this study

Table 2 shows the results of the survey of participants on the level of listening and expressing their opinions, assessed in three categories: low, medium, and high. It also shows the total number of respondents for each type of skill. Thus, a quarter of the applicants (25%) were argumentative, unable to listen, and were not oriented towards partnership in communication. This reflects a general trend among modern youth. Half (50%) were critical of what is said, often became offended and jumped to conclusions. These applicants lacked the traits of a good interlocutor and needed to work on their manner of speaking. Notably, 25% of applicants were excellent interlocutors and non-conflict people who knew how to listen. The communication style of such participants can be an example for other students.

The ability to express opinions was tested among senior students. The survey results revealed that 50% of the students are fluent in expressing their opinions and can formulate them promptly. However, a small proportion (8.5%) had not learnt to ask questions correctly to be understood, and did not speak politely and in a friendly manner. The ability to express their opinions is generally better developed than the ability to listen, which may be a consequence of an individual approach or the specifics of the training. More attention should be paid to improving listening skills through practical tasks that stimulate active perception of information.

CONCLUSIONS

An interdisciplinary approach is a crucial component of interactive teaching methods, which is fully correlated with the generally declared principles of higher education in Ukraine and the EU. It is the methods of active learning that activate the independence of students' opinions, involve them in information production, create an atmosphere of trust and mutual support, and make stakeholders active learning subjects. As the flexible Scrum methodology makes one feel more comfortable, it becomes possible to be more creative in organising the learning process. However, there are still some challenges that arise during the preparation and implementation of an interdisciplinary case scenario. The key problem that arises when applying interactive techniques is the lack of applied methodological developments for the development of economic thinking and studying complex educational material. The proposed methodological materials in the form of an interdisciplinary case study using elements of the Scrum methodology helped to observe one complex process divided into several smaller sprints. This approach aroused interest on both sides of the process and allowed work in teams (small groups of 5 people).

For the first time, the Department of Management launched a pedagogical experiment on the development of students' communication competences using elements of the flexible Scrum methodology in an interdisciplinary practical lesson, which enabled fourth-year students to assess the level of communication aptitudes, listening, and expressing their thoughts for their personal understanding of the degree of professional skills that can be demonstrated to an employer. Second-year students were given the opportunity to self-analyse their level of competence and assess the degree of its development. The findings of the study revealed that the use of elements of the agile Scrum methodology increases the ability to develop the communication skills of management students. Therefore, the authors of the present study see considerable potential in this area of research.

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Впровадження елементів методології Scrum в освітньому процесі в Україні: нові горизонти для розвитку комунікативних компетентностей

Анотація. В умовах цифровізації та розвитку технологій сучасні здобувачі покоління Z, які звикли до онлайн-навчання та цифрових гаджетів, потребують інноваційних підходів і сприятливого середовища для саморозвитку. Щоб ефективно навчати це покоління, викладачі мають акцентувати увагу на розвиток комунікаційних навичок, критичного мислення, креативності та інших важливих компетентностей. Дослідження мало на меті перевірити ефективність використання елементів гнучкої методології Scrum як інструменту розвитку комунікативних навичок у здобувачів через інтеграцію міждисциплінарного підходу. При проведенні дослідження були використані методи: теоретичного узагальнення і порівняння (розгляд суті та характеристика відмінностей між гнучкими методами), аналізу (анкетування, самоаналіз учасників кейсу), статистичний метод (зведення та групування даних для виявлення відсотку задоволеності учасників), синтезу (поєднання різних типів інформації). У результаті дослідження проаналізовано наукові праці українських та іноземних авторів щодо варіантів використання методології Scrum. Описано етапи практичного використання елементів гнучкої методології Scrum в освітньому процесі, обґрунтовано кожен із запропонованих етапів. Наведено статистику відповідей проведеного анкетування здобувачів другого та четвертого курсів для розуміння ефективності роботи в командах протягом міждисциплінарного практичного заняття. Проведено педагогічний експеримент із використанням елементів методології Scrum для розвитку комунікативних компетентностей здобувачів, що дало можливість здобувачам четвертого курсу оцінити свої професійні навички для майбутньої професії, а другокурсникам – провести самоаналіз рівня компетентності та зрозуміти напрямки для самовдосконалення. Експеримент сприяв формуванню ключових навичок спілкування й саморозвитку. Розроблено авторами алгоритм використання елементів методології Scrum у міждисциплінарних практичних заняттях. Продемонстровано результати емпіричного дослідження розвитку комунікативних компетентностей здобувачів із застосуванням трьох діагностичних інструментів. Практичною цінністю дослідження стало можливість запровадження його результатів у освітньому процесі при розробці навчальних дисциплін для різних курсів здобувачів вищої освіти

Ключові слова: міждисциплінарний кейс; робота в командах; спринт; власник продукту; фасилітатор; ретроспектива