sciendo

LOGI – Scientific Journal on Transport and Logistics
Vol. 16 No. 1 2025 DOI: 10.2478/logi-2025-0012

Towards Practice-Oriented Education in Transport: A Comparative Study of Student Perceptions

Dalibor Gottwald[1*] and Pavla Lejsková[1]

[1]*University of Pardubice, Department of Transport Management, Marketing and Logistics, Studentská 95, 532 10 Pardubice, Czech Republic; Email: dalibor.gottwald@upce.cz, pavla.lejskova@upce.cz*

***Corresponding Author:** Dalibor Gottwald

Received: 26 June 2025; Revised: 13 August 2025; Accepted: 25 August 2025; Published: 1 September 2025

Abstract: The article explores the modernization of educational strategies in the transport sector in light of the evolving demands of the 21st-century labor market. It addresses the mismatch between the current use of modern learning activities in university curricula and their perceived importance for developing students' professional competencies. A comparative survey was conducted at the Faculty of Transport Engineering (University of Pardubice) in the academic years 2021/2022 and 2024/2025, targeting full-time students across several study programs. The study assessed both the current level of implementation and the perceived importance of eleven modern learning activities inspired by practices at leading university coworking centers worldwide. The findings indicate a consistent gap between the actual application and the perceived value of these activities, especially in areas involving direct interaction with industry, mentoring, and participation in seminars or interdisciplinary projects. Based on the results, the article proposes strategic measures to improve alignment between education and practice, including the creation of an online university coworking center. This digital environment would facilitate collaboration, mentoring, and innovation, ultimately enhancing students' readiness to address the complex challenges of the modern transport sector.

Keywords: Transport education, modern learning strategies, professional competencies, transport management

1. Introduction

In recent years, the transport sector has been under significant pressure to adapt, driven by accelerating digitalization, automation, climate goals, and shifting societal expectations. These transformations present major challenges not only for operational practices but also for the way new professionals in the field are being prepared. While traditional educational approaches have long been

based on a transmissive model of learning and a focus on technical knowledge, current realities increasingly emphasize collaboration skills, interdisciplinary interaction, digital literacy, and the ability to respond to complex and dynamic problems [1-3].

Current trends in employability and labor market needs show a growing demand for professionals with so-called soft skills, critical thinking abilities, and independent decision-making capacity [4,5]. This shift also affects employers' expectations, as they increasingly require graduates not only to possess technical expertise but also to be capable of working in teams, managing projects, and communicating effectively in digital environments. Research also confirms that graduates of technical and transport-related programs often lack preparation in these areas, which complicates their adaptation to rapidly changing labor market conditions [6].

Given these developments, it is clear that sustainable development of the transport sector is not possible without a deeper transformation of educational strategies that better reflect current and future professional demands. One of the key areas of modernization is the implementation of modern teaching methods that connect students with the real world of transport, strengthen their practical competencies, and encourage responsibility for their own professional development. However, there is insufficient knowledge about which educational activities students perceive as most beneficial, and to what extent these activities are currently implemented in teaching.

The aim of this article is to analyze the gap between the current level of implementation of selected educational activities that enable the integration of modern learning approaches and their perceived importance for the professional development of transport students. The research is based on a comparative survey conducted in two time periods (academic years 2021/2022 and 2024/2025) and focuses on students at the Faculty of Transport Engineering, University of Pardubice.

The article's contribution lies not only in identifying activities with the greatest potential to improve students' professional readiness but also in proposing specific measures for educational institutions, including a recommendation to establish an online coworking center that would enable systematic implementation of these activities across the curriculum. The article thus contributes to the expert discourse on strategically modernizing education in technically oriented degree programs with a focus on the needs of the 21st century.

2. Theoretical Approaches to Modern Forms of Education

Education in the field of transport, like in other technical and applied disciplines, is undergoing a profound transformation driven by technological, economic, and societal changes [7-9]. The increasing emphasis on adaptability, digital literacy, teamwork, and the ability to solve complex problems calls for a rethinking of traditional instructional models in favor of modern learning approaches that prioritize active student participation, practical engagement, and the development of

soft skills [10-12]. Among the most frequently discussed approaches are collaborative and cooperative learning, project-based learning, blended learning, and problem-based learning.

Collaborative learning is based on the principle of mutual cooperation among students in solving tasks, problems, or projects. A key aspect is the sharing of knowledge, discussion, and joint decision-making, which fosters deeper understanding of the subject matter and the development of social skills. This approach is particularly effective in environments that support interactivity, trust, and open communication [13,14].

Cooperative learning is methodologically related to the collaborative approach but involves more clearly defined roles within a team. Each member is responsible for a specific part of the task, with success dependent on collective effort. This method contributes to the development of responsibility, planning, and the ability to work in a team[15,16].

Blended learning combines the benefits of face-to-face instruction with online formats. Its flexibility allows students to learn at their own pace while verifying and applying knowledge in contact-based learning sessions. In transport education, this model proves effective in linking theory with practice, for example through online simulations or digital case studies[17,18].

In addition to the approaches mentioned above, other modern strategies such as project-oriented learning, problem-based learning, mentoring, or peer learning are also used. These methods foster student autonomy, motivation, and the ability to tackle complex tasks. They reflect current professional demands and help shape competent professionals ready for an evolving job market [19,20].

An analysis of educational strategies applied in leading global university coworking centers, conducted as part of the preparatory phase of the research, enabled the identification of a set of activities frequently used in these environments. These activities serve as practical tools for implementing modern educational principles and can inspire innovation in teaching within the context of Czech transport education. The following coworking centers were analyzed:

- Stanford University (Stanford Venture Studio, StartX, d.school)
- Massachusetts Institute of Technology (MIT Innovation Initiative, Martin Trust Center for MIT Entrepreneurship)
- Harvard University (Harvard Innovation Labs, Launch Lab, Pagliuca Harvard Life Lab)
- University of California (SkyDeck, Berkeley Innovation)
- Columbia University (Columbia Startup Lab)

Based on the analysis, eleven key activities were defined that reflect the above-mentioned principles and meet the specific needs of professional education in transport:

- Project-based learning (solving real-world case studies)
- Multidisciplinary collaboration (working across fields and academic years)
- Direct engagement with industry (involving company representatives in education)
- Use of mobile phones and the internet during instruction
- Mentoring by industry professionals
- Consulting business plans with incubator representatives
- Opportunities for networking and building professional relationships
- Applying critical thinking principles in the learning process
- Self-study organization that supports student responsibility for professional development
- Participation in expert seminars and workshops
- Involvement in research and development projects in cooperation with the faculty and companies

This set of activities forms the foundation for the empirical research.

3. Methodology

The main objective of the research was to determine how students of the Faculty of Transport Engineering, University of Pardubice (Czech Republic), perceive the importance of activities that facilitate the implementation of modern forms of education in teaching. Specifically, these are activities implemented at leading global coworking centers (see Chapter 2). The importance of these activities was examined on two levels:

- *Assessment of the current situation:* Students evaluated the current use of each activity in the educational process on a scale of 1 to 6, where 1 means very low usage and 6 means very high usage. Ratings of 1–3 are perceived negatively, indicating a low level of activity utilization, while ratings of 4–6 are perceived positively.
- *Assessment of importance:* Students assessed the importance of each activity for enhancing professional competences if fully implemented in teaching, again on a scale from 1 (minimal importance) to 6 (maximum importance). Ratings of 1–3 are considered negative, indicating low relevance, while ratings of 4–6 are considered positive.

The survey was conducted twice. The first round involved full-time students of Faculty of Transport Engineering in the academic year 2021/2022. The second round was conducted among full-time students in the academic year 2024/2025. These students were enrolled in the following degree programs (bachelor's or master's level): Transport Means and Infrastructure, Transport Construction, Transport Technology, Technology and Management in Air Transport, and Technology and Management in Transport.

Since the entire target population was approached in both surveys (726 students in 2021/2022, and 878 in 2024/2025), it was not necessary to determine a sample size. This approach ensures the representativeness of the results.

3.1 Verification of the Objectivity of the Conducted Research

Before presenting the results of the questionnaire survey, it was necessary to verify the objectivity of the collected data set. objectivity was confirmed through validation and reliability testing.

3.1.1 Validation of Content Validity (Curricular):

The verification of curricular validity was carried out in several steps. In the first step (Activity 1), it was necessary to precisely formulate a statement whose validity was to be confirmed or refuted by selected competent individuals. The second step (Activity 2) involved selecting the experts. The administrator chose three competent individuals who had not previously participated in any activities related to the implementation of the proposed methodology. The third step (Activity 3) entailed preparing and distributing working documents. These included a unified overview of the activities identified in leading global coworking centers and a validated version of the questionnaire intended for students of Faculty of Transport Engineering. All documents were distributed to the selected experts. In the fourth step (Activity 4), the experts' comments were analyzed. These comments evaluated the degree to which the identified coworking activities had been successfully transformed into relevant content within the questionnaire. The analysis revealed that all three experts concluded that the research instrument included all of the key activities observed in the coworking centers.

The final step (Activity 5) involved confirming that curricular validity had been established for the questionnaire used during both data collection periods: academic years 2021/2022 and 2024/2025.

3.1.2 Confirmation of Validity – Construct Validity:

The verification of construct validity followed a similar multi-step process. As in the previous case, the first step (Activity 1) required formulating a statement for expert review. The second step (Activity 2) involved selecting new competent individuals who had not participated in any prior phases of the methodology development, including curricular validity verification. In the third step (Activity 3), a validated version of the questionnaire was distributed to all experts.

In the fourth step (Activity 4), the experts were asked to assess whether the questionnaire enables respondents to:

- Evaluate the current level of implementation of the given activities in the educational process at the Faculty of Transport Engineering, and

- Assess the importance of these activities (assuming full implementation in teaching) in developing professional competences.

All experts confirmed that the questionnaire is constructed in a way that allows respondents to evaluate both the current application of the activities and their potential impact on professional development. The final step (Activity 5) confirmed that construct validity was established for the questionnaire used in both academic years: 2021/2022 and 2024/2025.

3.1.3 Reliability Testing (Spearman–Brown Coefficient):

Reliability of the data set was tested using the Spearman–Brown coefficient, in order to assess the relative absence of measurement error. The calculations were based on data collected through the questionnaire. First, the correlation coefficient was determined:

r_p= 0.7376 (for data collected in 2021/2022), and r_p= 0.792 (for data collected in 2024/2025).

Next, the Spearman–Brown reliability coefficient was calculated:

r_{sb}= 0.849 (for data collected in 2021/2022), and r_{sb}= 0.884 (for data collected in 2024/2025).

Since both values exceed the threshold of 0.7, the data sets are considered reliable and therefore suitable for further analysis, indicating a minimal presence of measurement error.

In conclusion, having confirmed both validity and reliability, the condition for establishing the objectivity of the data collection technique and data set was fulfilled.

4. Results

The questionnaire was distributed to respondents electronically via the Google Forms web application. The survey was anonymous and included 11 items representing selected activities implemented in leading global coworking centers, which could potentially be incorporated into university-level teaching. The evaluation of the current state – specifically, the comparison between the perceived current implementation of the activities and their perceived importance for enhancing professional competences (assuming their full implementation in the curriculum), was conducted using the weighted average method. The overall results are presented below (Table 1, Figure 1).

4.1 Evaluation for the Academic Year 2021/2022

Assessment of the Current Situation (Part A): Students evaluated the current level of implementation of each activity in the educational process using a 6-point scale, where 1 indicated a very low level of implementation and 6 a very high level.

Assessment of Importance (Part B): Students rated the importance of each activity for enhancing professional competences, assuming full implementation in teaching, again on a scale from 1 to 6. A score of 1 indicated minimal importance (the activity has no relevance for competence development

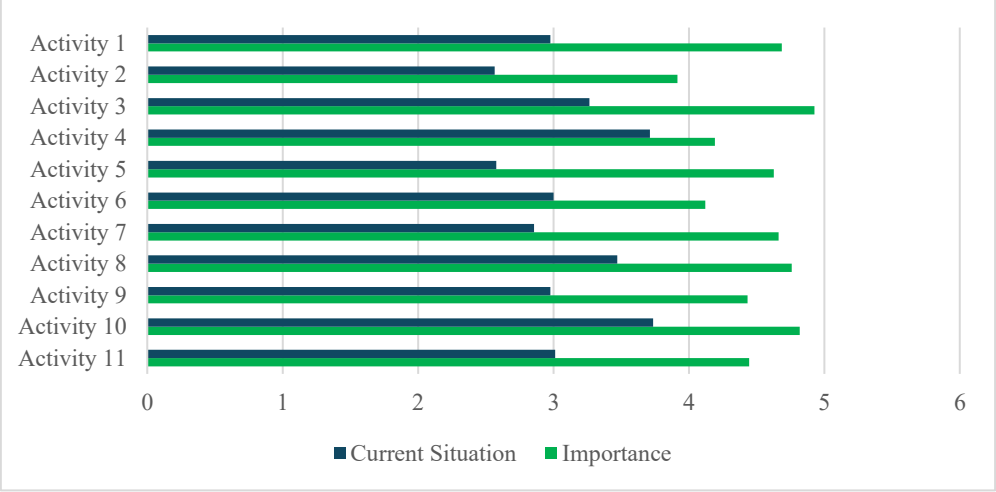
even when fully implemented), while a score of 6 indicated maximum importance (the activity significantly contributes to competence development when fully implemented).

Table 1 Weighted Average of Evaluation of Current Implementation and Perceived Importance (2021/2022). Source: authors

Activity No.	Current Situation (Part A)	Importance (Part B)	Difference
Activity 1	2.975	4.686	1.711
Activity 2	2.566	3.915	1.349
Activity 3	3.265	4.927	1.662
Activity 4	3.710	4.192	0.482
Activity 5	2.578	4.626	2.048
Activity 6	3.000	4.120	1.120
Activity 7	2.855	4.662	1.807
Activity 8	3.469	4.759	1.290
Activity 9	2.975	4.433	1.458
Activity 10	3.734	4.819	1.085
Activity 11	3.012	4.445	1.433

The value in the "Difference" column in Table 1 was calculated as the difference between the values in columns B and A.

Fig. 1 Graphical Representation of Current Implementation and Perceived Importance (Academic Year 2021/2022). Source: authors



Based on the research results presented in Table 1 and Figure 1, it is evident that for all observed activities, the current level of implementation is rated lower compared to their perceived importance for enhancing professional competences.

4.2 Evaluation for the Academic Year 2024/2025

Assessment of the Current Situation (Part A): Students evaluated the current level of implementation of individual activities in the educational process using a 6-point scale, where 1 indicated a very low level of implementation and 6 a very high level.

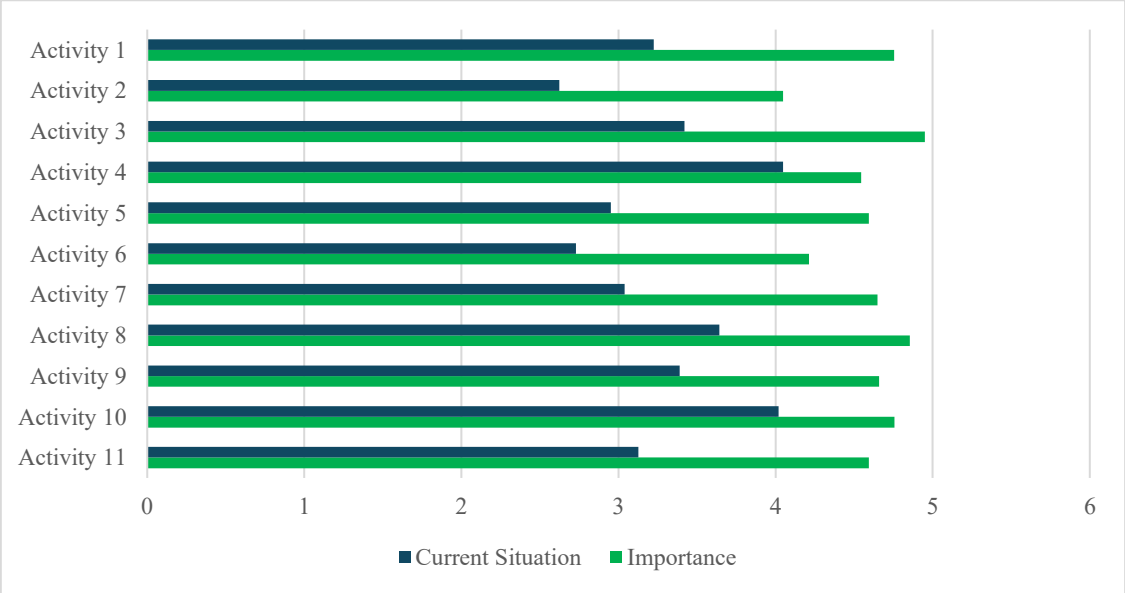
Assessment of Importance (Part B): Students assessed the importance of each activity for developing professional competences—assuming full implementation in teaching—on the same 6-point scale. A score of 1 indicated minimal importance (the activity has no relevance for competence development even when fully implemented), while a score of 6 indicated maximum importance (the activity significantly contributes to competence development when fully implemented).

Table 2 Weighted Average of Evaluation of Current Implementation and Perceived Importance (2024/2025). Source: authors

Activity No.	Current Situation (Part A)	Importance (Part B)	Difference
Activity 1	3.224	4.755	1.531
Activity 2	2.623	4.047	1.424
Activity 3	3.419	4.951	1.532
Activity 4	4.048	4.544	0.496
Activity 5	2.951	4.593	1.642
Activity 6	2.729	4.212	1.483
Activity 7	3.039	4.649	1.610
Activity 8	3.641	4.855	1.214
Activity 9	3.390	4.658	1.268
Activity 10	4.019	4.757	0.738
Activity 11	3.127	4.593	1.466

The value in the “Difference” column in Table 2 was calculated as the difference between the values in columns B and A.

Fig. 2 Graphical Representation of Current Implementation and Perceived Importance (Academic Year 2024/2024). Source: authors



Based on the research results presented in Table 2 and Figure 2, it is evident that the current implementation of all observed activities is rated lower compared to their perceived importance for enhancing professional competences.

5. Discussion and Conclusion

The research findings clearly demonstrate a discrepancy between the current degree of implementation of all observed activities in education and their perceived importance for the development of professional competences. This trend is consistent across both surveyed periods—the academic years 2021/2022 and 2024/2025. It follows that students clearly recognize the benefits of these activities but simultaneously perceive their insufficient integration into regular teaching.

Significant gaps were observed particularly in activities requiring a higher level of interaction with the external environment – specifically, Activity 3 (direct link with companies), Activity 5 (mentoring by industry professionals), and Activity 10 (participation in professional seminars and workshops). Students consider these activities crucial for transferring knowledge between academic and professional contexts. However, their implementation often encounters organizational, capacity-related, or systemic barriers.

Of particular interest is the evaluation of Activity 2 (multidisciplinary approach), which was rated as important but also showed a very low level of current implementation. This highlights a lack of support for interdisciplinary collaboration within educational programs, despite it being a highly sought-after competence in the complex environment of the transport sector. In contrast, Activity 4 (use of mobile technologies and the internet) was rated relatively high in terms of implementation, indicating that at least in the area of digital infrastructure, the university environment is more flexible and responsive.

In light of these findings, it can be concluded that the current teaching strategies are not sufficiently aligned with the needs of modern, practice-oriented education that emphasizes active student engagement. The absence of certain activities in the curriculum may significantly limit graduates' ability to respond effectively to contemporary challenges in the transport sector.

- Based on the results, several key strategic recommendations can be formulated for educational institutions:
- Strengthen cooperation with industry by systematically involving company representatives in teaching, mentoring, and project supervision.
- Develop interdisciplinary projects and create conditions for collaborative problem-solving across disciplines and academic levels.
- Increase the availability of non-formal educational activities (seminars, workshops, start-up incubators) that support entrepreneurship and innovation.
- Revise curricula to better support student responsibility for their own professional development and enhance flexibility in acquiring additional competences.
- Implement principles of critical thinking across all forms of teaching, thereby strengthening students' ability to analyze independently and make informed decisions.

Based on the findings, establishing a university-level online coworking center emerges as the most effective systemic measure. This digital environment could serve as a flexible and continuously accessible platform where students participate in interdisciplinary projects, consult ideas with industry experts, connect with mentors, and engage in community-based knowledge sharing. The online format would eliminate barriers related to physical space, broaden opportunities for participation across study programs, and potentially serve as a vibrant innovation incubator linking academic and professional worlds.

To operationalize this proposal, we suggest that the online coworking center be developed as an integrated university platform with the following planned functionalities: (1) a virtual project space enabling multidisciplinary student teams to collaborate in real time on case studies and research assignments; (2) a mentoring interface allowing students to schedule consultations with industry professionals and academic staff; (3) a knowledge-sharing hub featuring recorded expert lectures, workshop materials, and thematic discussion forums; and (4) a networking module for establishing contacts between students, alumni, and external partners. From a technical perspective, the platform should be accessible via both web and mobile applications, with integration into the university's learning management system (LMS) to streamline authentication and course enrollment. Security measures must include role-based access control and compliance with data protection regulations. Prior to full deployment, a pilot test involving selected courses and volunteer student groups should be conducted to evaluate usability, technical performance, and the added value for teaching and learning. Feedback from the pilot phase will guide adjustments before campus-wide implementation.

The implementation of such a center would represent not only a concrete step toward modernizing education, but also a strategic investment in the future of the transport sector. Strengthening the connection between academia and real-world practice is essential not only for preparing graduates to adapt to change, but for empowering them to shape the future of the transport sector.

Acknowledgments

This research received no external funding.

References

[1] Muntaka, A.S., Agyei-Owusu, B., Manso, J.F. & Kankam-Boadu, E. (2023). Pursuing Transport Digitalisation to Achieve Transport Cost Optimisation. Supply Chain Forum: An International Journal 25(4), 522-534. DOI: 10.1080/16258312.2023.2238667.

[2] Durand, A., Zijlstra, T., Hamersma M., Hoen A., van Oort, N., Hoogendoorn, S. & Hoogendoorn-Lanser, S. (2023). Fostering an Inclusive Public Transport System in the Digital

Era: An Interdisciplinary Approach. Transportation Research Interdisciplinary Perspectives 22, 100968. DOI: 10.1016/j.trip.2023.100968.

[3] Skrickij, V., Bazaras, D., Sakalys, R. & Kojis P. (2024). The Needs of Researchers Implementing Supply Chain Digitalisation. Transport and Telecommunication Journal 25(3), 335-344. DOI: 10.2478/ttj-2024-0025.

[4] Edler, J. & Infante, V. (2019). Maritime and Other Key Transport Issues for the Future - Education and Training in the Context of Lifelong Learning. Transactions On Maritime Science 8(1), 84-98. DOI: 10.7225/toms.v08.n01.009.

[5] Hitka, M., Lizbetinova, L., Javorcikova, J. & Lorincova, S. (2023). Managing Employee Motivation in Slovak Universities from the Perspectives of Time and Age. Education Sciences 13(6), 556. DOI: 10.3390/educsci13060556.

[6] Poláková, M., Horváthová Suleimanová, J., Madzík, P., Copuš, L., Molnárova, I. & Polednová, J. (2023). Soft Skills and their Importance in the Labour Market Under the Conditions of Industry 5.0. Heliyon 9(8), e18670. DOI: 10.1016/j.heliyon.2023.e18670.

[7] Alenezi M. (2023). Digital Learning and Digital Institution in Higher Education. Education Sciences 13(1), 8. DOI: 10.3390/educsci13010088.

[8] Popelo, O., Kholiavko, N., Safonov, Y., Shaposhnykova, K, Babukh, I. & Yamniuk, B. (2024). Global Trends Of Universities Digitalization Under The Sustainable Development Concept. Management Theory and Studies for Rural Business and Infrastructure Development 46(4), 473-481. DOI: 10.15544/mts.2024.44.

[9] Fernández, A., Gómez, B., Binjaku, K. & Meçe, E.K. (2023). Digital Transformation Initiatives in Higher Education Institutions: A Multivocal Literature Review. Education and Information Technologies 28(1), 1-32. DOI: 10.1007/s10639-022-11544-0.

[10] Mandro, L., Borysova, S., Lykhodieieva, H., Zapotichna, M. & Tovstukha, O. (2024). Interdisciplinary Approach To The Development Of Soft Skills In The Educational Process: Integration Of Knowledge And Skills. Cadernos Educacao Tecnologia E Sociedade 17(1), 433-444. DOI: 10.14571/brajets.v17.n1.433-444.

[11] de Novais, A., Matelli, J.A. & Silva, M.B. (2025). Fuzzy Soft Skills Assessment through Active Learning Sessions. International Journal of Artificial Intelligence in Education 34(2), 416-451. DOI: 10.1007/s40593-023-00332-7.

[12] England, T.K, Nagel, G.L. & Salter, S. (2019). Using collaborative learning to develop students' soft skills. Journal of Education for Business 95(1), 1-9. DOI: 10.1080/08832323.2019.1599797.

[13] Posey, L. & Lyons L.B. (2009). The instructional design of online collaborative learning. In: Luzzato, E. & DiMarco, G (Eds.), Collaborative Learning: Methodology, Types of Interactions and Techniques (pp. 363-382). New York: Nova Science Pub Inc.

[14] Chatmaneerungcharoen, S., Jakra, A. & Nielsen, W. (2025). Collaborative lesson study: enhancing grade 2 students' explanations of scientific phenomena through outdoor STEM learning in the Context of Phuket Province. Multidisciplinary Science Journal 7(11). DOI: 10.31893/multiscience.2025559.

[15] Strenio J. (2023). Cooperative learning exercises in an online asynchronous economics classroom. Journal Of Economic Education 54(4), 429-439. DOI: 10.1080/00220485.2023.2236606.

[16] Song, M.H., Lim, J., Seunghee, L., Jungjoon, I. & Jooyong, P. (2025). Enhancing group outcomes: the role of individual preparation in collaborative learning. BMC Medical Education 25(1), 524. DOI: 10.1186/s12909-025-06925-1.

[17] Navío-Marco, J., Ardura, D. & Galán A. (2025). Teamwork skills development in hybrid and online universities: the perspective of the future teachers. Journal of New Approaches in Educational Research 14(1), 13. DOI: 10.1007/s44322-025-00032-1.

[18] Buła, P., Thompson, A. & Żak, A.A. (2024). Nurturing teamwork and team dynamics in a hybrid work model. Central European Management Journal 32(3), 475-489. DOI: 10.1108/CEMJ-12-2022-0277.

[19] Maasø, A. & Simonsen H.G. (2023). Problem-Based Peer Group Mentoring and Organisational Learning. In: de Lange, T. & Wittek, L. (Eds.), Higher Education Dynamics (pp. 113-130). DOI: 10.1007/978-3-031-37458-6_7.

[20] Bastiansen, S. & Wittek L. (2023) Problem-Based Peer Group Mentoring: A Tool for Faculty Development. In: Bastiansen, S. & Wittek L. Higher Education Dynamics (pp. 131-154). DOI: 10.1007/978-3-031-37458-6_8.