

IMMERSIVE TEAM-BASED LEARNING IN TRANSNATIONAL VIRTUAL CLASSROOMS

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Abstract

This study explores the impact of a transnational team-based virtual learning experience on students' self-perceived learning outcomes. The purpose of this research is to identify students' self-perceived learning outcomes in virtual classrooms and describe the attributes of team members considered valuable for achieving team goals and learning success. Students who participated in a team-based international joint course across three editions from 2020 to 2022 completed reflective learning journals, which served as data collection research instruments. The researchers utilized a mixed-methods approach, combining quantitative and qualitative methods, along with thematic content analysis, to examine 327 validated source documents. The results revealed that students highly valued the transnational team-based learning activities during the virtual course. Participants highly valued the transnational nature of the course, as it facilitated effective collaboration within international teams and developed cross-cultural understanding skills. The virtual learning environment played a crucial role in enabling cultural exchange and understanding, fostering active participation, and encouraging reflective practice for groups of students from different countries and universities. Additionally, the study emphasized the development of digital skills as students engaged in transnational collaborative online learning using advanced technologies for communication and teamwork across distances. The digital learning environment positively influenced students' motivation, sense of belonging, and camaraderie. The research identified 16 self- and hetero-identified attributes of team members, deemed valuable by participating students for achieving teamwork goals and learning outcomes. Attributes such as effective communication, collaboration, goal-oriented attitudes, and organizational skills were among the most highly regarded. These findings underscore the importance of transnational team-based virtual learning experiences in preparing students for global labor market demands. The study highlights the significance of fostering collaboration, cultural understanding, and digital literacy skills in educational settings.

Keywords

team-based learning, transnational teams, virtual classrooms

Introduction

The society of the future, for which the students are preparing in universities, is a dynamic one, with many problems to be solved, decisions to be made, a lot of uncertainty, and unforeseen consequences. One of the biggest challenges for universities is to prepare future specialists, working in interdisciplinary teams with people from different parts of the world, with different cultural backgrounds, who are very heterogeneous in their ways of thinking and acting. On the other hand, the universal design of technologies has opened opportunities for students, and therefore, higher education is adopting digital technology the fastest and is being transformed by it the most.

These were the premises from which we started organizing a course, which was designed, implemented, and evaluated together by teaching staff, students, and employers from two different countries, from two different educational systems, and with different social profiles.

In this transnational collaborative learning project, Classroom Laboratory (CL) (Berge, 2020), we incorporated curriculum development elements grounded in Team-Based Learning (TBL), Collaborative Online International Learning (COIL), Problem-Based Learning (PBL), Virtual Learning Environment (VLE), and Teambuilding - Teamwork - Team performance, TTT model (Dincă et al., 2023). Guided by these collaborative learning models, a transnational course was implemented in the virtual environment within PBL teams, following the TTT model of group dynamic. This research aims to assess the impact of the CL curricular model on learning outcomes.

The dynamics of the labor market have determined higher education institutions to identify effective didactic methods and strategies for the formation of competencies among students and for ensuring their good training and professional insertion (Orzan et al., 2012). The simple organization of students in groups and the assignment of tasks proved insufficient for the formation of teamwork skills, with the educators concluding that teamwork skills must be taught, learned, and evaluated like any other professional or transversal competence (de Prada et al., 2022). One of the didactic strategies aimed at developing teamwork skills among students, applied both in traditional face-to-face teaching as well as in the online environment in virtual classes, is team-based learning (TBL) (Haidet et al., 2014; Ghannam & Ahmad, 2020).

TBL represents a processual approach to learning in which, through collaboration, groups of students accumulate new knowledge, develop their teamwork skills, pursue a common objective, and address an authentic, real problem specific to the professional environment in which they are going to work (Palsolé & Awalt, 2008; Michaelsen & Sweet, 2008; Michaelsen et al., 2014; Ficapal-Cusí & Boada-Graub, 2015). In a TBL learning environment, the teacher plays the role of a learning facilitator who realizes the design of the learning context while offering ongoing support and feedback. The students are solely responsible for learning (Michaelsen & Sweet, 2008; Ficapal-Cusí & Boada-Graub, 2015). A useful practice in teaching is team teaching, used both in the design and in the development of the didactic activity, with benefits for both students (the possibility of obtaining a second opinion, another perspective) and teachers (the exchange of good practices) (Burgess et al., 2020). Permanent teacher feedback, as well as communication and peer evaluation with a formative function within the student teams, are significant and crucial not only for learning but also for the efficiency of teamwork (Reinke, 2001). In TBL, feedback is an integral part of the teaching process, being used as an indicator of student progress, of possible weak points, and also as a motivational factor (Burgess et al., 2020; Brown et al., 2021). Possible mistakes are perceived as challenges meant to make learning more efficient, with the role of the teacher in this sense being that of creating an open and tolerant learning environment (Silva et al., 2021).

Among the benefits of using TBL in teaching are active learning, student-centeredness, interactivity, the possibility of working with a large number of students and stimulating students' motivation for learning as they reach a level of independent, autonomous learners (Michaelsen, Davidson, & Major, 2014; Emke, Butler, & Larsen, 2016; Ghannam & Ahmad, 2020; Burgess et al., 2020). Through TBL, students become aware of the importance of their own learning and its contribution to the team's success (Parmelee et al., 2012). The use of TBL in online teaching has the advantage of being an accessible and flexible method. One of the conditions for the effective use of TLB in virtual classes is the provision of a more heterogeneous, stable, and permanent structure of student teams, which is essential for the

development of communication skills, critical thinking, problem solving, collaboration, and teamwork (Michaelsen & Sweet, 2008; Hrynchak & Batty, 2012; Michaelsen et al., 2014; Yuretich & Kanner, 2015; Burgess et al., 2020; Vannini et al., 2022 ; Costa e Silva et al., 2022).

COIL is an innovative pedagogical approach that leverages technology to connect students from different cultural backgrounds in collaborative international learning experiences. COIL fosters cross-cultural communication, collaboration, and the exchange of perspectives by integrating globally situated tasks into the curriculum. Through synchronous and asynchronous online interactions, students engage in joint projects, discussions, and activities that enhance their intercultural competence and understanding. COIL not only transcends geographical boundaries but also promotes a deeper appreciation for diversity, preparing students for the interconnected and interdependent nature of our globalized world (Leask, 2020).

Problem-Based Learning (PBL) is an instructional methodology that places students at the center of their learning experience. In PBL students collaboratively solve real-world problems that require critical thinking, problem-solving skills, and interdisciplinary knowledge. These authentic, complex scenarios serve as the driving force for learning, prompting students to explore and understand the subject matter in a contextually meaningful way. PBL emphasizes self-directed and self-reflective learning, as students actively engage in research, analysis, and solution development. This approach not only enhances subject-specific knowledge, but also cultivates essential skills such as teamwork, communication, and lifelong learning skills (Crasovan, 2022). PBL thus empowers students to become proactive learners who can apply their knowledge to address complex challenges in both academic and professional settings.

The TTT model of group dynamic (Dinca et al., 2023) proposes 3 stages of group learning, each contributing to the development of certain transversal skills: team building, teamwork, and team performance. This model captures the stages of formation and development of teamwork skills, such as collaboration, communication, learning and trust.

Due to COVID 19, universities were forced to accelerate the digitalization of higher education and integrate advanced technologies into the teaching-learning-evaluation process. Education thus had to quickly move the classrooms from onsite to online environment. The virtual learning environment (VLE) is a much more flexible environment, characterized by different changes: role of the teacher (from source of information to guidance or counselor); role of the students (students learning become more active); flexibility in time, space, and choosing different tools of communication; teaching strategies (changing the didactic strategies with accent upon self-directed learning; the changing role and frequency of feedback (students asking for feedback more often) (Martin et al., 2021).

Many teachers have learned on the fly, and even if we are talking about great progress and an acceleration of the use of VLE, certain aspects still need to be improved, from teacher training (O'Rourke et al., 2015) to student activation methods (Yuhanis Omar, 2021) to the development of alternative assessment methods (Nuere-Salgado et al., 2021).

VLE may seem to the current generation as a very clear and simple concept, but in fact it is a complex and dynamic one, thanks to the evolution of new technologies (Alves et al., 2017), which is built through its defining notes. Dillenbourg et al. (2022) reviewed the characteristics of VLE highlighting the multifaceted nature of this educational environment: Firstly, a VLE is not merely a digital space for learning; it is a social arena where students engage and interact collaboratively. The virtual space itself is explicitly represented, emphasizing the significance of the online environment in shaping the learning experience. Students within a VLE are not passive recipients of information but active participants, playing the role of actors and authors of their educational journey. Importantly, the concept of virtual learning environments extends beyond the realm of distance education, challenging the notion

that these platforms are exclusively designed for remote learners. VLEs showcase a remarkable integration of heterogeneous technologies and a diverse range of pedagogical approaches, creating a dynamic and adaptable learning environment. Crucially, the boundaries between virtual and physical environments become blurred in most VLEs, highlighting the seamless integration of online and offline aspects of learning.

VLE has several advantages, among which we can mention advanced collaboration and communication, convenience (costs, didactics, learning) efficiency, VLE user control, personalization, ubiquity, task orientation, and timeliness of VLE-driven learning and teaching (Ozkan & Koseler, 2009; Sitzmann, Kraiger, Stewart, & Wisher, 2006), enhanced learning ability and problem-solving skills (Phungsuk, Viriyavejakul, Ratanaolarn, 2017), promote reflection, accommodate the needs of students, increase enthusiasm and confidence, improved readiness to learn (Caprara, Caprara, 2022; Barker, Gossman, 2013). VLR can offer tools that can support the production and distribution of contents, communication, and evaluation of teaching and learning processes (Alves et al., 2017).

Context of the study: The NTNU-UVT Joint Course, a transnational team-based virtual learning experience

The Norwegian University of Science and Technology (NTNU) and the West University of Timisoara (UVT) collaborated to develop a UVT-NTNU joint course, which provided undergraduate and master's program students with an immersive transnational collaborative team-based learning context (see **Table 1**).

Table 1. The UVT-NTNU Joint Course learning context

Characteristic	Strategies	Targeted learning outcomes
Immersive team-based learning in transnational and virtual environment	Following the Teambuilding – Teamwork – Team Performance model (Dincă et al., 2023), students practiced and developed transversal competencies of communication and collaboration across distance in an authentic learning context.	Teamwork skills in transnational and virtual environment.
Real-time interactions in virtual classroom	Oral discussions, debates, group reflective activities, formative assessment, peer-to-peer feedback.	Communication and collaboration skills used in transnational teams. Digital skills
Reflective learning	Reflective journal, self-assessment questionnaires, feedback to peers	Reflective learning and self-regulation skills; Increasing students involvement and autonomy in learning
Open educational resources (OER)	Open-access learning materials, including the course syllabus, open social statistics, country reports and other OERs	Digital literacy skills for education and research purposes

Authentic learning	<p>a) By bringing real-life cases into the virtual classrooms to be analyzed and solved through the transnational and interdisciplinary team-based activities</p> <p>b) By bringing international students real-life experiences, educational background, thoughts and ideas into the virtual classrooms and used them as teamwork resources</p>	<p>Stimulating the socio-cultural exchange and reflective practice;</p> <p>Authentic transnational collaborative skills</p>
Formative assessment	<p>Starting with the pre-understanding phase to the end of the learning process, students were engaged in multiple feedback from peers and teaches, and self-assessment techniques</p>	<p>Skills to monitor and evaluate progress in a personal and cultural sensitive manner;</p> <p>Involvement and commitment to learning;</p> <p>Reflective learning skills</p>

The learning context was a specific COIL, in the sense that students with a different cultural, national, and educational background collaborated in teams in the virtual environment, with the help of advanced technology, aimed at pursuing the same objective (Ingram et al., 2021; Angeles Mestre-Segarra & Ruiz-Garrido, 2022; Hackett et al., 2023; Liu, 2023). Communication in a non-native language (in this case, the joint course language was English), building trust and cohesion at the team level, the co-presence of students in the online environment, and the use of the expertise of Romanian students in terms of documenting a real-life social problem for the solution of which transnational student groups collaborated were as many specific COIL elements that can be found in the UVT-NTNU Joint Course (also in accordance with the COIL model proposed by Hautala & Schmidt, 2019).

The choice to use COIL was made easier by the benefits of this learning method in the context of internationalizing higher education. These benefits include hands-on learning, communication, and teamwork as a way to build knowledge and skills, active, student-centered learning, making students more motivated and responsible for their own learning, developing critical thinking and problem-solving skills, interdisciplinary learning, and the growth of cultural understanding (Gokcora, 2021; Vahed & Rodriguez, 2021; Naicker et al., 2022; Vahed, 2022; Hackett et al., 2023; Liu, 2023).

Why does the transnational team-based learning context matter? The UVT-NTNU joint course was innovative when it started, from several points of view:

- brought together students from two different countries, from two different educational systems, from different specializations and levels of study (BA and MA); the course was carried out online and included synchronous and asynchronous collaborative online activities, with the students being encouraged to use all the means of communication they test and find to be more suitable and effective.

- the students chose together, in interdisciplinary teams, a social problem for which they had to identify realistic solutions that were possible to implement; the problems were proposed by the various stakeholders and updated according to current social dynamics (for example, work opportunities for disadvantaged people in post-COVID).

- the students collaborated in teams to solve real-life social problems, looking for information from multiple sources, including stakeholders from the labor market, employers, non-government organizations, local authorities' representatives.

- the role of the teachers was not to transmit information in a masterful manner, but rather offering small inputs, expectations, and formative feedback, being partners in the process of co-construction of learning.

- the curriculum of the UVT-NTNU joint course was designed by a team of teachers and teaching assistants from both universities and it was continuously refined during a co-creation process based on the input provided by transnational and interdisciplinary teams of students, teachers and researchers from partner universities, and other stakeholders which were directly involved in the learning process.

- an integral part of this course was the research dimension, which was conducted for the entire duration of the course, collecting, processing, analyzing various data from the participating students and teachers.

- the evaluation assumed two important components, namely: the presentation of the real-life social problem and the identified solutions, but also the self-assessment and students' reflections on the learning process and group dynamics in the transnational, interdisciplinary, and virtual learning context of the course.

Methodology

Research purpose

The research aimed to document and identify students' perceptions of their learning outcomes in the UVT-NTNU CL Joint Course. Through the exploration, description, and explanation of students' experiences, the study seeks to unveil their perspectives on learning in the transnational team-based, virtual learning environment.

Research question

What are the students' perceptions of the impact of the UVT-NTNU CL Joint Course transnational team-based in virtual classrooms on their learning outcomes?

Research objectives

OB1. To identify the students self-perceived learning outcomes of transnational immersive team-based learning in virtual classrooms.

By analyzing the students' observations, descriptions, and assessments of the transnational immersive team-based virtual learning activities, the research will identify what skills were practiced and developed during the UVT-NTNU Joint Course and the way this particular learning design fosters the development of certain transversal competencies.

OB2. To describe the self-identified attributes of team members that are considered valuable for achieving team goals and learning activity success, from the participant students' perspective.

When describing the team-based learning activities, the participants usually refer to the teamwork variables, such as the interpersonal relations between the team members, the dynamics of group processes, the characteristics of team members, and the team as a primary social group. Starting from these premises, the second research objective aims at identifying a list of self- and hetero-identified attributes of the team members that students consider to be important for achieving the team goals and learning results.

Research method

Students' reflections about the transnational team-based learning context were repeatedly collected throughout the entire duration of the learning process. For the present study, the reflective journals completed by the students participating in three editions of the NTNU-UVT Joint Course in the academic years 2020-2021, 2021-2022, and 2022-2023 have been used.

The source documents, derived from completed and validated reflective journals,

underwent translation and adaptation into English. Subsequently, they were processed, categorized based on importance, and subjected to a mixed-method content analysis that incorporated both quantitative and qualitative approaches.

The participant students completed and submitted reflections were automatically collected into an Excel database, compatible with various processing software. For this analysis, the database was imported and processed using MAXQDA Analytics Pro Academia software, facilitating a mixed-method analysis encompassing both qualitative and quantitative aspects.

The results were interpreted hermeneutically in conformity with the theoretical framework and ongoing debates in the research community, shaping the following discussion and conclusions.

Research instrument

The reflective journal was used in the UVT-NTNU Joint Course as a part of the reflective practice for students. It consists of an open-ended question with instructions for completing it in writing and is delivered to the students in a digital form using a link or QR-code to a Google Forms document:

“Take a few minutes to reflect on your activities related to the UVT-NTNU Joint Course. Express your thoughts, feelings, attitudes, expectations, achievements, and plans regarding the UVT-NTNU Joint Course activities (Please write your response in English, Norwegian or Romanian language).”

The teachers encouraged the students to complete the reflective journal as part of their reflective learning practice, but there was no requirement to do so. The students may opt to complete the reflective journal in their mother language - Romanian or Norwegian - or in English, depending on the language in which they are more comfortable writing and can freely express their thoughts, ideas, and feelings.

Participants and source documents

There have been 327 validated source texts, corresponding with the completed learning journals, with meaningful texts in relation to descriptors, thoughts, attitudes, and feelings about the teamwork dynamics that developed or occurred in the team-based learning context of the UVT-NTNU Joint Course.

Findings

Researchers repeatedly read the source documents collected over the three academic years (between 2020 and 2022), validated the meaningful responses of 327 source documents to the open-ended question in the Reflective Journal, and selected all the text segments expressing the team-based learning and students’ interactions during the teamwork activities.

The data driven analysis revealed 1726 text segments directly and explicitly referring to team-based learning activities and teamwork dynamics. Further, for all the text segments were created and assigned 36 codes, grouped into 4 parent codes, as could be seen in **Table 2**.

Table 2. Coded segments

Parent codes	Codes	Number of coded segments
General value allocated by the participant students to the	Positive	188
	Neutral	4

teamwork activities	Negative	3
Team-based learning developed the collaboration in teams skills	Teamwork skills	120
	Communication skills	95
	Digital skills, ICT and open educational resources for learning	43
	Personal development	30
	Professional competencies	29
	Team-based learning skills for elaboration of a scientific paper	28
	Problem-solving skills	21
	Decision-making skills	21
Team-based learning developed a cultural understanding of transnational teamwork dynamics	Learning about the other cultures, values and everyday life	142
	Cultural understanding of foreign organizations and people	99
	Develop teamwork experience in a transnational context	88
	Understand the value of different perspectives	66
	Community-needs-oriented, became aware of the social inequalities	45
Which attributes of the team members are valuable for teamwork success?	Effective collaboration in teams	162
	Goal oriented	93
	Efficient communication	89
	Well organized and good at planning and task distribution	55
	Excited to learn and work together	45
	Freely express ideas, attitudes, and thoughts	41
	Intensive collaborative work	35
	Hardworking teammates	34
	We help each other	32
	Rewarding	25
	Cope with time management difficulties	23
	Cope with the fact that some team members are not actively involved	22
	Effective decision-making process	19

	Social skills	16
	Joy and sense of humor	13

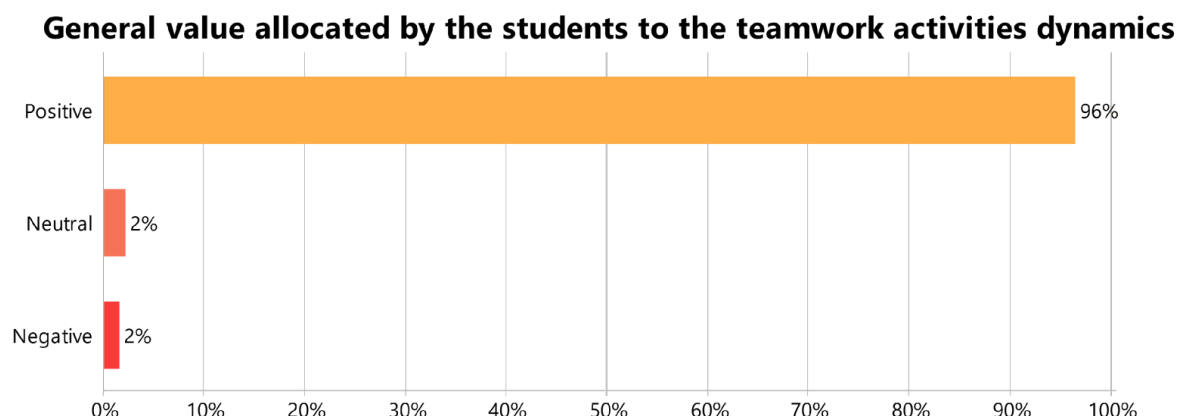


Figure 1. General value allocated for the teamwork activities dynamics descriptions, from the students' perception. Number of coded segments: 211

The text segments which are describing, in general terms, the teamwork dynamics were coded with one value between positive, neutral, or negative. Almost all descriptions received a positive general value, showing the students' appreciative attitudes towards the teamwork dynamics, as could be seen in the above **Figure 1**.

We must mention that most Romanian students affirmed that team-based learning activities are very rarely encountered in their educational path, and more often competition is valued over collaboration, together with the individual success and comparison between students. They considered that the Romanian educational system did not foster the development of teamwork skills. Even if the Romanian students were not used to team-based learning contexts and the Norwegian students declared that they had consistent previous education in teamwork skills, both categories of students positively appreciated the teamwork dynamics taking place in the transnational and virtual learning context of the UVT-NTNU Joint Course.

The text segments expressing positive reactions to the teamwork dynamics are clustered into two aspects of the curricular design of the UVT-NTNU Joint Course. The analysis revealed two key particularities that are most frequently appreciated by the participant students and are considered beneficial for their learning experience:

(a) The UVT-NTNU Joint Course fosters cultural exchange and cultural understanding. The team-based transnational learning in virtual classrooms structured the students from Romania and Norway in mixed study groups, learning how to collaborate in teams. To form an effective team, students' interactions were not only goal-oriented, but also focused on getting to know each other, building trustful relations, and maintaining an increased levels of participation, involvement, and commitment. In this context, the participating students had the opportunity to learn about their foreign colleagues' cultural backgrounds. The students were interested in learning about their cultural heritage, customs, organizational culture, student life, living conditions, and quality of life. *“Overall, it was a very good experience. We really grew into a fine group with great meetings. It was interesting to learn about Romanian culture and Timisoara”* (C., study program: Logistics, NTNU, Norway, November 29, 2022); *“It has been very interesting working with students from another country and a different culture. I have definitely learned a lot about collaboration across digital platforms to turn ideas into solutions.*

However, the process has been somewhat the same as what I am used to from other courses at NTNU (such as EiT), with the main difference being collaborating with people from another country far away. Overall, a cool experience” (J., study program: Mechanics, NTNU, Norway, November 29, 2022); “I am delighted with this course. I love the diversity of the team I work with. I am amazed at the organization and dedication of students in Norway” (D., study program: Education Sciences, UVT, Timișoara, Romania, November 15, 2022); “Working with a diverse team is fantastic, especially when half the team is from another country” (J., study program: Mechanics, NTNU, Norway, October 19, 2022); “I learned a lot about Norwegian culture and about the education system in Norway, but also about the educational system in Romania because I had to contact specialists in the field. This cultural exchange was very interesting, and I hope to participate in more projects like this in the future” (D., study program: Sociology, UVT, Timișoara, Romania, 29-2022).

(b) The students appreciated the innovative learning context of the UVT-NTNU Joint Course. The international, interdisciplinary, team-based, and advanced technology-based learning context was appreciated by the participants, as one of the students revealed: *“During this course, the activity is diverse. We go from classic lectures to VR, being in a Google Meet or in a Virtual Reality workroom with students from across the continent with whom we have to solve a social issue. Personally, I find this a wonderful opportunity to get to know people I otherwise wouldn't and to expand my skill set in areas I otherwise wouldn't get the opportunity to” (R., study program: Digital media, UVT, Timișoara, Romania, October 19, 2022).*

Following the first research objective of our study, to identify the students self-perceived learning outcomes of transnational team-based learning in virtual classrooms, the data-driven analysis results identified two main learning outcomes of team-based learning in virtual classrooms:

1. Collaboration in team experiences
2. Cultural understanding of transnational teamwork dynamics

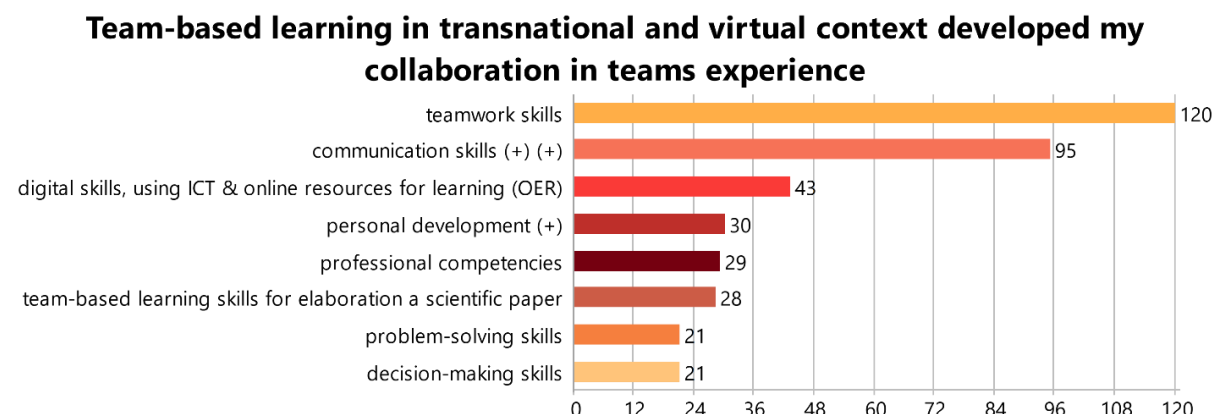


Figure 2. Coded segments under the parent code “Team-based learning in transnational and virtual contexts develops collaboration through team experiences”. Number of analyzed source documents: 327. Number of codes and subcodes: 11. Number of coded segments: 387

Collaboration and communication skills were often described in the reflective journals. In total, 387 text segments were coded with collaboration and team-related skills (**Figure 2**). For a large part of the students, the teamwork development in a learning context created especially for this purpose was a novelty, and it was frequently appreciated.

After setting up direct and synchronous communication platforms such as Google Meet, MS Teams, Zoom, or Metaverse meetings using virtual reality workrooms, Romanian and Norwegian students started to develop effective collaborative relationships with each other. One of the participant students noted: *“In order to have a good start in our teamwork, we had to know each other and learn about everyone’s hobbies, preferences, and future plans” (...)* *“These weeks I learned a lot of new things and about a lot of different perspectives. This outcome is very important for my learning and was possible due to the fact that our teams of students were so diverse, interdisciplinary, and multicultural, and every work meeting was indeed formative. So that the collaboration between us developed very well”* (P., study program: Geography, UVT, Timișoara, Romania, November 24, 2021).

Other students reflected on the different ways they practiced and developed collaboration skills in teams during the learning activities. They referred to the development of conversational and written communication skills, describing the different digital platforms they test to find the proper communication channel for each teamwork activity. For example, they used Google Suite for Education and add-ons freely accessible from their student accounts to elaborate their team activity reports, documentary research papers, and presentations, but also used Doodle, WhatsApp, and Discord social media platforms to chat and schedule their synchronic work meetings. Other students referred to the decision-making process in their team, exemplifying various ways of adopting a decision or a working plan to progress in their team goal achievement. Students were interested in sharing their thoughts, observations, and emotions about the team processes and the specific personal and social skills they used in the teamwork situation. *“I consider this course to be an excellent practice in soft skill development, especially for communication and collaboration in teams and also leadership”* (B., study program: Informatics, UVT, Timișoara, Romania, October 27, 2021); *“I learned a lot about how to collaborate in an international team and understand the process of decision-making in a team. [...] I learned how to organize tasks in a team and how to communicate effectively at a distance through digital means”* (I., student, female, UVT, Timișoara, Romania, October 29, 2021); *“I developed my teamwork skills and effective communication”* (C., study program: Sociology, UVT, Timișoara, Romania, October 22, 2020); *“Learning about the difference in culture was interesting. I wish we had used more time to gain trust in each other since it still feels like nobody really knows each other in the group. So getting everyone’s opinion is sometimes difficult. But overall, I think the group is doing a good job communicating and collaborating!”* (A., study program: Mechanics, October 19, 2022, Trondheim, Norway).

The students’ observations showed that team members’ dynamic interactions influenced the learning process and development of collaboration skills, such as digital skills used for collaboration between team members across distances, group decision-making skills, social skills, the ability to use team members’ resources, problem-solving abilities, and collaborative learning skills. *“I learned a lot about the refugees by studying social statistics we found on the websites of international public organizations and by sharing our knowledge between team members”* (A., study program: Geography, UVT, Timișoara, Romania, November 10, 2021); *“Has contributed to digital arrangements in the form of meetings, a common platform for sharing thoughts and ideas (Google Docs). I have also contributed here by setting up the meeting structure, clarifying the task, and providing some ideas for how the task can be carried out”* (E., study program: Mechanics, October 19, 2022, Trondheim, Norway); *“A particular skill I mainly developed is being able to cooperate with a group of people with a different background in a different country using a different language. I believe it will be very useful to gain such experience for future work because we live in a continuously globalized community”* (O., study program: Mechanics, October 19, 2022, Trondheim, Norway).

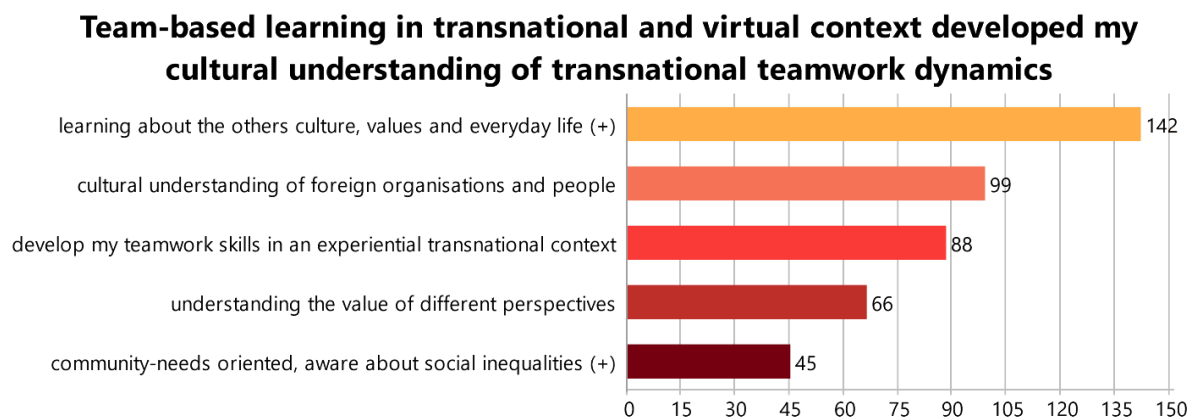


Figure 3. Coded segments under the parent code “Team-based learning in transnational and virtual contexts develops the cultural understanding of transnational teamwork dynamics”. Number of analyzed source documents: 327. Number of codes and subcodes: 7. Number of coded segments: 440

The analyzed reflective journal’s responses, observations, and testimonials that offer detailed information about how the students were learning in transnational teams showed that this particular learning setting fosters students’ cultural understanding of international teamwork dynamics in terms of relations, interactions, and understanding a foreign real-life situation.

The main learning task for the students participating in the UVT-NTNU Joint Course was to solve an authentic social problem affecting a certain vulnerable category of people from Romania. To explore and find a feasible solution for such an inaccessible social problem due to time, space, and cultural differences, students used the virtual environment of the course setting (including the advanced technology of virtual reality) to explore the cultural differences and similarities between Romanian and Norwegian students. The virtual environment gave students numerous opportunities for collaboration and to document social problems without being limited by the physical space. But more valuable, the transnational team composition gave the students the opportunity to understand and use the different cultural perspectives, interpret the multifaceted significance of various aspects of the studied social problem, and test a set of realistic alternative solutions for it, as this student reveals: *“It is interesting that our priorities as Romanian students are different in comparison with our Norwegian colleagues. We, the Romanian students, prioritize food, time, and money, or income management. The Norwegian students seem not to think a lot about these issues. Even related to our team-based project, which is the refugees’ social integration, the Norwegians are not focused on finding ways of providing solutions for the basic needs of the refugees, like food, work integration, and a guaranteed income”* (A., study program: Digital Media, UVT, Romania, November 2, 2021). *“It’s important to me that I learn how to cooperate with people with the same background as me, and I think that this course is a good start on the path there. One takes it for granted that people will share the same prerequisites when cooperating. But from what I’ve already seen, there is a huge difference in the way people, even on the same page, behave and think. Cultural norms and rules set a really different basis for collaboration. I think it’s unique this time to be able to directly talk with the people affected by the problem we’re trying to solve. [...] I therefore think it’s important for us to be able to kind of get rid of our stereotypes and predisposed thoughts about Romania and Romanians and instead ask open-ended questions to them. I think it’s going to be hard, but I look forward to learning more about their culture and*

how they would think differently than us. Even though we might have some insight about the pressing issues in question, I think that the Romanians living with these issues every day have a better understanding of what the consequences are on a day-to-day basis” (A., study program: Mechanics, NTNU, Norway, October 1, 2022).

Other students share their thoughts about the influence of cultural exchange on their teamwork dynamics. *“I consider that I gained a totally new learning experience by observing and working together with Norwegians. I understand a new approach and attitude towards learning by reflecting on their interactions with us and their attitudes toward the teamwork processes”* (C., study program: Sociology, UVT, Romania, November 1, 2020); *“I learned how to work in a team with Romanian and foreign students I didn’t know before. I didn’t know their skills, knowledge, competencies, ambitions, reactions, or attitudes. So, I have to learn to speak up, to be more empathic, to have new perspectives, and to be helpful to Romania, November, and others. I learned about cultural differences between Romania and Norway, differences I thought about after every learning activity and teamwork meeting, we had. It was the most interesting learning activity I had”* (A., study program: Geography, UVT, Romania, November 24, 2020).

Being one of the first cultural exchange learning experiences for the students attending the UVT-NTNU Joint Course, they were excited to take part actively in the social dimension of the transnational teamwork activities. The team-based learning in a virtual environment enhanced students' engagement, motivation, and openness towards their peers, especially from the partner university. *“It was a nice opportunity to work with people from other places around the world. I see it as crucial to know how to work together with people over great distances since the world is getting smaller and smaller. With the digitalization that is happening, more and more work will be international”* (T., study program: Mechanics, NTNU, Norway, October 19, 2022); *“I am excited about working in this cross-cultural group with so many different students”* (D., study program: Education Sciences, UVT, Romania, October 19, 2022); *“This opportunity helped me figure out more about what I’m good at or what I lack. It also showed me that in a good environment, you can grow to like a subject. I inevitably kept my interest high. This course’s environment helped me to be this way”* (R., study program: digital media, UVT, Romania, November 29, 2022).

The students' reflections often included comparisons between Romanian and Norwegian cultural aspects and how these differences affected the team dynamics. *“I think it just took a while to really get to know each other and understand the group dynamics and how to operate together. [...] I have learned that working in groups and voicing my own opinion is not scary, but also that Norwegian people are very open-minded”* (A., study program: Engineering, NTNU, Norway, No. 5, November 2022); *“The NTNU-UVT Joint Course has been going great so far. The way we have to work with each other and cooperate is great, and I think it will prove to be a good learning experience down the line. It’s also really great to be able to “see” the people you’re working with who are, in reality, 3000 kilometers away”* (D., study program: Music, UVT, Timișoara, Romania, November 29, 2022).

Following the second research objective of our study, OB2. ‘To describe the self-identified attributes of team members that are considered valuable for achieving team goals and learning activity success from the participant students’ perspective’, the data-driven analysis results presented a set of 16 self- and hetero-identified attributes of team members that are considered by the participant students to be valuable for achieving the teamwork goals and the intended learning outcomes. This attribute list can be seen in **Figure 4**.

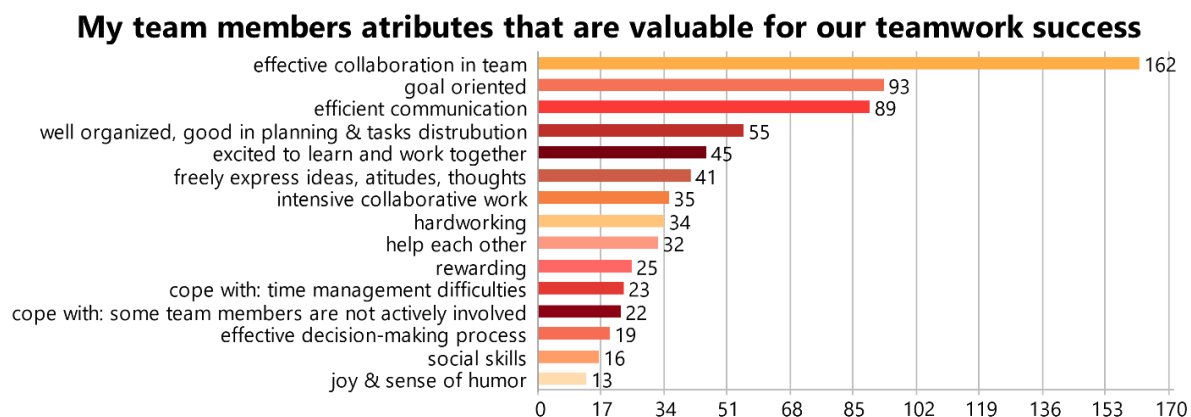


Figure 4. Self- and hetero-identified attributes of team members that are considered valuable for teamwork success. Number of analyzed source documents: 327. Number of coded segments: 704. Number of codes: 16

The most appreciated of these attributes are communication and collaboration skills, as well as goal-oriented activities and attitudes. Some of these relevant text segments are illustrated below:

"We collaborate so well that we become able to understand each other's jokes. [...] We are not only teammates but start to be friends, and this is surprisingly done exclusively through online means, like Google Meet and MS Teams" (A., male, study program: Digital Media, UVT, Timișoara, Romania, 23, 2021); *"Together with our colleagues from Norway, we get along well. We started collaborating better and better. We listen to each other, we fall by mutual agreement most of the time, we communicate, and we will collaborate in teams"* (O., study program: Management, UVT, Timișoara, Romania, 29, 2022, Timișoara, Romania); *"The collaboration with the NTNU Students just gets better and better with each session. We are learning together how to deal with the obstacles so that we meet the project deadline"* (C., study program: Modern languages, UVT, Timișoara, Romania, 29, 2022).

Other teamwork-related attributes described as influencing the students' team-based learning success are the following: being a good organizer and task distributor; intensively collaborating and hardworking; the ability to share and help others; the ability to cope with time management difficulties; and organizing an effective decision-making process. For example, the following paragraphs extracted from the students' reflective journals reveal a list of such attributes: *"I am part of a team formed by students that previously did not know each other. Despite this, my opinions were not ignored by the others; I am helped by my team colleagues, and I am thinking that we will progress into an effective team"* (A., study program: Modern Languages, UVT, Timișoara, Romania, 10, 2020); *"Everything is alright with our team. The team's colleagues are hardworking people. Nobody feels shy about expressing their own opinions, and that's the most important aspect of our teamwork"* (S., study program: Modern Languages, UVT, Timișoara, Romania, 4, 2020); *"We gathered some fruitful information about the activities of the Faber and the Ambasada NGOs. I am so happy to have hard-working team colleagues and that we understand each other very well. Reflecting on this learning experience, I consider it very interesting, formative, and funny. I would like to repeat it anytime!"* (R., study program: Geography, UVT, Timișoara, Romania, November 23, 2021).

Another category of team-member characteristics revealed by the students' reflections cumulates those attributes that contribute to a positive, open, and well-being state of collaboration in teams: joy, expressing enthusiasm, rewarding feeling, excitement, and openly

sharing attitudes and thoughts, as are described in the following quoted text segments: “*I confess that I wish to be part of such a team all the time in the future, or at least to know that the team I will be part of has the chance to develop at the same level of effective collaboration that our team at the NTNU-UVT Joint Course is at right now. Every one of us is interested in teamwork and contributes with enthusiasm, which ensures the best emotional and active state for us as a workgroup and also at the individual level*” (A., study program: Design, UVT, Timișoara, Romania, November 4, 2020); “*My team manages to be efficient without being pressured, in a comfortable and positive atmosphere*” (N., study program: Informatics, UVT, Timișoara, Romania, 28, 2020); “*It is fun to work with students from another university in another country. I am excited about the presentation and exam.*” (S., program study: Logistics, NTNU, Norway, 19-2022).

Discussions

This research is an essential part of the process by which partner universities from Romania and Norway are working together to develop an across distance transnational collaborative university course in virtual environment. The course design proposes an evidence-based approach known as Classroom Laboratory, wherein research is actively interwoven with teaching practices. Over a span of three years, this approach was developed, implemented, and critically evaluated as part of two transnational collaboration projects.

Prior research within the project has focused on various aspects, such as the project team composition (Dincă et al., 2021), team dynamics within the learning groups (Dincă et al., 2023), as well as the influence of self-reflection on the learning process (Luștrea et al., 2023).

The present study investigates students' perceptions of their experiences in the UVT-NTNU Joint Course, with a specific focus on their learning outcomes within a transnational, project team-based, and virtual learning environment. The research objectives aimed to identify students' self-perceived outcomes in this particular learning context and to describe the attributes of team members that students consider valuable for achieving team goals and learning success.

To address the research objectives, the study utilized reflective journals completed by students who participated in three editions of the UVT-NTNU Joint Course from 2020 to 2022. A total of 327 validated source documents were collected, and the data were subjected to a quantitative-qualitative mixed method called thematic content analysis.

The research results indicated that students highly valued the team-based learning activities and teamwork dynamics during the course.

The transnational team composition provided a unique opportunity for cultural exchange, fostering collaboration, communication, and cultural understanding of international work relations skills, which were frequently mentioned in the students' reflections.

Cultural diversity is a reality of our times, both at the societal and organizational levels, and universities have an important role in training well-prepared higher education graduates for the current demands of the labor market (Petrova et al., 2022). Working in transnational teams, both face-to-face and in the virtual environment, also constitutes a reality and a challenge that students and future specialists must face (Levitt, 2016). A possible solution is experiential learning (Wahlstrom et al., 2007), which is intended to put students in authentic learning situations, in which learning, and reflection intertwine in order to develop professional and transversal competencies.

Working in transnational teams is not without difficulties, especially in the initial phase, when not knowing each other can generate tensions that affect collaboration. Mittelmeier et al. (2018) showed that, despite the attractiveness that cultural diversity can exert, students appreciate working in transnational teams as challenging, and in some situations, they even

showed a refusal to collaborate with foreign students. Stimulating socialization, as well as the teacher's intervention in mediating tense situations, have proven beneficial in overcoming cultural barriers within teams and ensuring group solidarity and a sense of belonging (Poort et al., 2022). Working in a team involves numerous challenges that students must face. If a monocultural team is faced with problems such as decision-making, planning, problem solving, conflict management, time management, and conforming and respecting group rules, in a transnational team, cultural diversity of values, norms, and language is added, which students must be able to manage effectively (Popova et al., 2012).

Students who carry out learning activities in transnational teams, therefore characterized by cultural diversity, have developed independent learning, communication, collaboration, and adaptation skills; they have registered an increase in the level of motivation for learning and a decrease in prejudices and stereotypes; and they have developed creativity, responsibility, and critical thinking (Poort et al., 2022; Jiang et al., 2023). Beaudry & Toth Szalvai (2018) highlighted the fact that one of the benefits of working in transnational teams is, besides the implicit one, the contact and exposure to cultural differences, a better knowledge of one's own culture, but also the students' reflection on the implications that cultural diversity affects teamwork and the acquisition of the necessary skills to manage this cultural diversity. Jiang et al. (2023) included the following benefits of working in transnational teams: professional development through the sharing of ideas and the identification of alternative solutions to various problems; respect and acceptance of cultural differences; and advancement on an emotional level in terms of curiosity, empathy, tolerance, and managing uncertainty. The cultural diversity of transnational teams is therefore a key element of their collaboration and functioning (Urionabarrenetxea et al., 2021), with a directly proportional relationship between team diversity and teammates' commitment (Poort et al., 2022). Cultural diversity has even been called a “double-edged sword” or “mixed blessing”, because it can be both a source of conflict and an obstacle to team functioning, but also a catalyst for learning (Stahl & Maznevski, 2021).

The students enjoyed the virtual learning environment and valued the course's interdisciplinary and global nature, which allowed them to work well with peers from various backgrounds.

Their reflections revealed attributes of team members considered to be the most valuable for achieving team goals and successful learning outcomes. These attributes included effective communication, collaboration, goal-oriented attitudes, good organizing skills, hard work, the ability to share knowledge, the capacity to receive help and help others.

Conclusions

The results of this study offered several valuable conclusions regarding the impact of the UVT-NTNU CL Joint Course on students' learning experiences and the significance of transnational team-based, virtual learning environments:

- Enhanced Collaborative Skills: The research findings demonstrate that the transnational team-based learning context significantly enhanced students' collaborative skills. Engaging in team-based learning activities with peers from different cultural backgrounds exposed students to diverse perspectives on using their digital skills, collaborative, and communication skills. As a result, they learned how to effectively collaborate, and work towards shared goals in a cross-cultural setting. This enhanced ability to collaborate in teams can prove invaluable in their future careers as globalization and remote work become increasingly prevalent in the professional landscape.
- Cultural Exchange and Understanding: The UVT-NTNU Joint Course facilitated a rich cultural exchange experience for students from both universities. By working closely with team

members from different countries, students gained a deeper understanding of cultural differences and similarities. This exposure to diverse cultural norms and values promoted empathy, tolerance, and a broader global perspective among the participants. It also highlighted the importance of intercultural communication and sensitivity in fostering effective collaboration and problem-solving in an increasingly interconnected world.

- Digital Literacy and Learning in a Virtual Environment: This particular setting of the course provided students with an opportunity to develop their digital skills for learning and scientific research purposes. As they engaged in online meetings, utilized open educational resources, online collaborative tools, and navigated digital platforms, they became more adapted at leveraging technology for effective communication and learning. These digital skills are becoming indispensable in modern education and the workplace, making the UVT-NTNU Joint Course a relevant experience in the digitalization of the higher education era.

- Positive Learning Environment: Students expressed high levels of satisfaction and enthusiasm for the UVT-NTNU Joint Course's novelty and innovative learning environment. The use of virtual reality, interactive online platforms, and transnational collaborations created a positive teamwork dynamic and engaging learning attitudes and actions. This positive learning environment not only increased students' motivation and sense of belonging but also facilitated a sense of camaraderie and friendship among participants. Such positive learning experiences are known to foster greater retention of knowledge and contribute to students' overall academic and personal growth.

- Opportunities for Personal and Professional Development: The course allowed students to step out of their comfort zones and explore new ways of learning and collaborating. The challenges they encountered while working in transnational teams provided valuable opportunities for personal and professional development. Students learned to adapt, communicate effectively in virtual settings, and navigate cultural differences to achieve their academic objectives successfully. These experiences equip them with valuable skills that can be transferred to various aspects of their student lives and future careers.

- Recognition of Educational Gaps: The research revealed that some students, particularly those from the Romanian university, had limited prior experience with team-based learning. The study highlighted the need for educational institutions to place greater emphasis on developing teamwork skills and promoting collaborative learning environments. By recognizing these gaps, educators can take proactive steps to incorporate more international team-based learning activities into their curricula and better prepare students for the demands of an increasingly interconnected world.

Overall, the findings highlighted the positive impact of the UVT-NTNU CL Joint Course on the students' learning experiences, emphasizing the significance of transnational team-based, virtual learning environments in promoting international collaboration, cultural understanding, and the development of valuable skills for future global interactions. The research contributes valuable insights into the effectiveness of such learning initiatives and the importance of promoting teamwork skills in educational settings.

The UVT-NTNU Joint Course provides a meaningful and transformative learning experience for students, enabling them to develop critical teamwork skills and foster cultural understanding, thereby contributing to their overall personal and academic growth. The results also indicate the potential benefits of incorporating more team-based virtual learning experiences into educational curricula, facilitating collaboration and communication among students from diverse backgrounds in a globally interconnected world.

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