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Investigating Factors Influencing Student Satisfaction in Virtual Collaborative Learning (VCL): A Literature-Based and Empirical Analysis

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Abstract

This paper examines the implementation of Virtual Collaborative Learning (VCL) within higher education institutions (HEIs) in the Western Balkans, focusing on the COWEB project—Promoting and Facilitating Collaborative Virtual International Learning in the Western Balkans' Higher Education Institutions. The study highlights how VCL serves as an innovative pedagogical approach, enhancing cross-border collaboration, digital competencies, and 21st-century skills among students and academic staff. Through the development of virtual/blended learning spaces and co-created course content, the project addresses the challenges of limited international exposure and fosters a culture of digital collaboration. Preliminary findings indicate improved engagement and learning outcomes, suggesting that VCL can be a sustainable model for modernizing teaching and learning practices in the region.

Keywords: Virtual Collaborative Learning, Higher Education, Western Balkans, Digital Pedagogy, Cross-border Collaboration

INTRODUCTION

In the digital era, higher education is increasingly shaped by virtual and collaborative pedagogies. Among these, Virtual Collaborative Learning (VCL) and Collaborative Online International Learning (COIL) have emerged as prominent frameworks that leverage digital technologies to foster collaboration, intercultural exchange, and active learning among geographically dispersed learners. These models offer scalable, flexible, and interactive learning designs that extend across institutional and national boundaries.

COIL, in particular, integrates international perspectives into curricula by connecting students from different countries in shared, project-based learning experiences. It is rooted in the concept of "internationalization at home," enabling cross-cultural collaboration without requiring physical mobility (Wimpenny et al., 2024; Appiah-Kubi & Annan, 2020). VCL, on the other hand, encompasses a broader spectrum of digitally mediated collaborative learning, not limited to international contexts, and is often implemented within or across institutions to promote teamwork, communication, and problem-solving in virtual environments (Tawileh et al., 2014).

As both COIL and VCL gain traction, understanding student satisfaction with these models becomes essential. Satisfaction not only reflects learners' immediate experiences but also correlates with engagement, retention, and long-term learning outcomes. This article presents an integrated literature-based and empirical exploration of the factors influencing student satisfaction within VCL environments. It examines how satisfaction is shaped by instructional design, technological facilitation, intercultural interaction, and perceived support. By combining theoretical perspectives with statistical evidence, the study identifies the key conditions under which VCL becomes a successful and satisfying experience for students.

LITERATURE REVIEW

Defining Virtual Collaborative Learning (VCL)

Virtual Collaborative Learning (VCL) is a pedagogical model grounded in constructivist theories of learning. It leverages web-based tools and virtual environments to engage learners in collaborative tasks, often involving multi-user virtual environments (MUVEs), avatars, and synchronous or asynchronous communication channels (Tawileh, Bukvova, & Schoop, 2014; Ibáñez et al., 2013). In these spaces, students co-construct knowledge through problem-solving, dialogue, and peer interaction.

VCL shares similarities with COIL, which connects students from different cultural and institutional backgrounds to work on joint projects, typically as part of a course. While COIL emphasizes intercultural competence and global citizenship, VCL focuses more broadly on collaborative processes in digitally enabled learning environments. Both models contribute to digital literacy, communication skills, and the development of collaborative dispositions (Byker et al., 2023; Júnior & Finardi, 2018).

Benefits of VCL

VCL has been credited with several educational benefits. One of the most commonly acknowledged benefits is enhanced engagement and motivation among learners. Studies report that students involved in VCL settings tend to show higher levels of accountability and sustained interest in their coursework compared to those in traditional settings (Song & Elftman, 2024; Breen, 2013). This engagement is often attributed to the autonomy learners experience, as well as the interactive and dynamic nature of virtual collaboration.

Another key benefit is the development of collaborative and soft skills. VCL environments are structured to promote teamwork, communication, and critical thinking—skills essential for both academic and professional success in the 21st century (Dincă et al., 2023; Li et al., 2022). Through participation in virtual teams, students learn how to coordinate, negotiate roles, and resolve conflicts, often across cultural and institutional boundaries.

VCL also promotes flexibility and accessibility. By design, virtual collaboration allows learners to engage in academic activities independent of time and location constraints, making it especially suitable for students with varying schedules, responsibilities, or geographical limitations. This aspect of VCL contributes to greater inclusivity in higher education (Pei & Wu, 2019; Ignacio et al., 2022).

A frequently cited benefit of VCL is the high level of student satisfaction. Satisfaction in VCL is often linked to learners' sense of ownership over their learning process, their ability to make meaningful contributions to group work, and the social presence established through peer collaboration (Campbell et al., 2024; Herriott & McNulty, 2022).

Furthermore, when VCL is implemented through a COIL framework, it contributes to the development of intercultural competence. COIL-based VCL brings students into contact with peers from diverse cultural backgrounds, fostering a deeper understanding of global issues and a sensitivity to diverse perspectives. This intercultural fluency is increasingly seen as a vital outcome of higher education in a globalized world (Durand & Balhasan, 2023; Niitsu et al., 2022).

Limitations of VCL

Despite its advantages, VCL is not without its challenges. One of the most significant limitations is technological barriers. Not all students have access to reliable internet connections or compatible devices, which can hinder their ability to fully participate in virtual collaborative activities (Ignacio et al., 2022). This digital divide creates inequities in learning opportunities and can lead to feelings of exclusion or frustration among affected students.

Communication issues also pose a considerable challenge in VCL environments. The lack of non-verbal cues, such as facial expressions and body language, can lead to misunderstandings and reduce the richness of interactions. Moreover, asynchronous communication may result in delayed responses, weakening the immediacy and continuity of collaboration (Andrews & Rapp, 2015).

Uneven group dynamics further complicate the VCL experience. In some cases, certain students may take on dominant roles while others disengage or contribute minimally. Such imbalances can foster resentment, diminish motivation, and undermine the collaborative process (Jackson, Bilich, & Skuza, 2018).

Another critical concern is the risk of social isolation. Although VCL aims to create a sense of community through digital interaction, some learners may struggle to establish meaningful connections with their peers. This lack of social presence can lead to feelings of disconnection and reduced engagement, particularly for students who are more socially or emotionally dependent on face-to-face interactions (Herriott & McNulty, 2022; Wang et al., 2024).

Finally, the pedagogical demands of VCL require significant training and preparation on the part of facilitators. Effective virtual instruction demands not only technological proficiency but also the ability to design inclusive, equitable, and engaging collaborative activities. Without adequate training, instructors may struggle to foster the kind of interactive and learner-centered environment that VCL aims to promote (Paulsen et al., 2024).

RESEARCH QUESTION

Given the advantages and challenges outlined in the preceding sections, this study investigates the factors that contribute to student satisfaction in Virtual Collaborative Learning (VCL) environments. Student satisfaction in VCL is often influenced by a constellation of interrelated factors that shape learners' perceptions, engagement, and overall experiences. One of the central aspects affecting satisfaction is the learner's self-efficacy and confidence in using digital tools and engaging in virtual collaboration. When students feel confident in navigating the virtual learning environment, they are more likely to participate actively and perceive the experience as meaningful and beneficial.

Equally important is the quality of tutor and institutional support provided throughout the course. Students who feel supported by their instructors, particularly through timely feedback and guidance, tend to report higher levels of satisfaction. Institutional resources, including access to technical support and well-structured learning materials, also play a role in shaping these experiences.

The nature of teamwork and peer interaction is another influential factor. VCL environments rely heavily on collaboration, and the perceived effectiveness of group work can significantly impact learners' satisfaction. When students experience equitable contributions from team members and constructive interpersonal dynamics, they are more likely to enjoy the learning process and feel a sense of accomplishment.

The appropriateness of teaching methods and the overall organization of the course also contribute to satisfaction. Clear task instructions, logical sequencing of activities, and engaging pedagogical strategies help learners maintain focus and motivation. Additionally, the development of key skills such as time management, intercultural communication, and collaboration contributes to a sense of personal and academic growth, which reinforces satisfaction.

Lastly, the relevance of the learning activities to students' personal goals, cultural backgrounds, or professional interests can strengthen their connection to the course content. When students find meaning in their work and see its applicability to real-world contexts, their satisfaction with the learning experience tends to increase.

Thus, the research question that guides this study is: What factors influence student satisfaction in Virtual Collaborative Learning (VCL) environments?

EMPIRICAL RESEARCH

Data and Method

Data for this study were collected via an online questionnaire distributed after the completion of pilot Virtual Collaborative Learning (VCL) courses implemented within the framework of the COWEB Erasmus+ Project. These pilot courses were designed to evaluate innovative approaches to digital collaboration across partner higher education institutions. The questionnaire was completed by more than 100 individuals, including students, academic staff, and e-tutors who had participated in the VCL modules. For the purposes of this statistical analysis, a subset of 33 fully completed responses was selected to ensure the reliability of the findings.

The survey included items rated on a 1–5 Likert scale and assessed various dimensions of the VCL experience, such as satisfaction, skill development, peer collaboration, and support systems. Descriptive statistics were applied to examine trends and distributions in the responses. Pearson correlation was used to assess the relationships between variables, and multiple linear regression was employed to identify the key factors predicting student satisfaction. All assumptions for regression—including linearity, multicollinearity, and normality of residuals—were tested and met before interpreting the results.

Analysis and Discussion

The descriptive statistics present a generally favorable perception of the VCL experience among participants. The mean value for student satisfaction is 4.70 (SD = 0.64), indicating that most students rated their VCL experience very positively. This high average is noteworthy and aligns with the literature suggesting that virtual collaboration, when well-structured, leads to strong learner satisfaction due to increased autonomy, engagement, and social presence (Campbell et al., 2024; Herriott & McNulty, 2022).

Confidence after the course has a mean of 4.15 (SD = 0.91), suggesting that the VCL course helped many students feel more assured in their abilities to engage in virtual collaboration. While this score is slightly lower than satisfaction, it still reflects a generally positive shift in perceived competence, which supports the assumption that post-course confidence contributes significantly to satisfaction (as confirmed in your regression model).

E-tutor support also received a high average score (M = 4.45, SD = 0.94), highlighting the importance of human facilitation even in digital settings. Tutors who offer timely feedback and maintain learner motivation are key to successful VCL environments, as also emphasized by Paulsen et al. (2024).

Regarding the collaborative dimensions, working in international virtual teams (M = 4.55, SD = 1.03) and collaboration skills (M = 4.64, SD = 0.70) were both highly rated. These scores reinforce the effectiveness of VCL in promoting group work and soft skill development, especially in cross-cultural or multidisciplinary settings (Dincă et al., 2023).

Pedagogical design also appears to be well received, with teaching/learning methods (M = 4.48, SD = 0.67) and workshop organisation (M = 4.39, SD = 0.65) scoring high, indicating clarity in course structure and learning activities. These elements are critical in minimizing cognitive load and maintaining student engagement, as noted in previous studies (Pei & Wu, 2019).

Skill-related measures such as time management skills (M = 4.42), intercultural skills (M = 4.52), learning skills (M = 4.61), and pedagogical skills (M = 4.30) also show strong outcomes. The slightly lower score for pedagogical skills may reflect variability depending on participants' roles—e.g., students versus educators—or the extent to which the course involved instructional design components.

Despite generally high means, the standard deviations for variables like “working in international teams” and “intercultural skills” (both around 1.0) suggest some diversity in experiences, possibly due to differing levels of prior exposure or cultural readiness. This variability is worth exploring further in qualitative follow-ups.

In summary, these descriptive results portray a highly positive VCL experience across all measured dimensions, with student satisfaction, collaboration, tutor support, and skill development emerging as

particularly strong. They provide a compelling rationale for further statistical modeling to examine how these factors interrelate and predict overall satisfaction.

Table 1: Descriptive Statistics for Key Variables Related to Student Satisfaction in VCL

Variable	*Mean*	*SD*	*Min*	*Max*
Satisfaction with VCL experience	4.70	0.64	2	5
Confidence after the course	4.15	0.91	2	5
E-tutor support	4.45	0.94	1	5
Working in international virtual teams	4.55	1.03	1	5
Collaboration skills	4.64	0.70	2	5
Teaching/learning methods	4.48	0.67	3	5
Workshop organisation (timing, ICT, etc.)	4.39	0.65	3	5
Time management skills	4.42	0.90	1	5
Intercultural skills	4.52	0.97	1	5
Learning skills	4.61	0.83	2	5
Pedagogical skills	4.30	1.02	2	5

The correlation matrix reveals the strength and direction of linear relationships between key variables—namely, student satisfaction, confidence after the VCL course, and e-tutor support. All reported correlations are positive, suggesting that increases in one variable are generally associated with increases in the others, albeit to varying degrees.

The strongest correlation in the matrix is between student satisfaction and confidence after the course ($r = 0.44$). This moderate positive correlation suggests that learners who gained confidence in their ability to engage in virtual collaborative environments tended to report greater satisfaction with their overall experience. This finding is consistent with the literature, which highlights the importance of self-efficacy in influencing student engagement and perceived success in online and collaborative learning (Artino, 2008; Zimmerman, 2002). It supports the view that confidence may serve as a mediating factor between instructional practices and student satisfaction.

The correlation between student satisfaction and e-tutor support ($r = 0.38$) is slightly lower but still moderate and meaningful. This finding implies that students who perceived stronger support from e-tutors also reported higher satisfaction with the VCL experience. E-tutors serve as facilitators, guides, and motivators in online settings, and their presence is often linked with a sense of connection and security in digital learning (Baran et al., 2013). Though not the strongest predictor, e-tutor support

remains an important factor in shaping students' perceptions of a supportive and responsive learning environment.

Interestingly, the correlation between confidence after the course and e-tutor support ($r = 0.10$) is quite low, indicating a weak relationship. This may suggest that confidence gains are more closely related to task engagement, peer interaction, or internal learner factors than to the perceived availability or helpfulness of tutors. Alternatively, it could reflect a limitation of the measure itself or indicate that tutor interventions were not consistently impactful across all learners.

Taken together, these correlations suggest that while both confidence and tutor support are associated with satisfaction, confidence plays a slightly more substantial role. These findings align with the results of your regression model, in which confidence emerged as a significant predictor of satisfaction. However, due to the correlational nature of the data, no causal claims can be made—future studies using longitudinal or experimental designs could explore this dynamic in more depth.

Table 2: Correlation Matrix of Student Satisfaction, Confidence, and E-Tutor Support

	Satisfaction	***Confidence After***	***E-Tutor Support***
Satisfaction	1.00	0.44	0.38
Confidence After	0.44	1.00	0.10
E-Tutor Support	0.38	0.10	1.00

The multiple linear regression model identified two statistically significant predictors of student satisfaction in Virtual Collaborative Learning (VCL) environments: confidence after the course and time management skills. Together, these variables contributed to a model that explains approximately 69.1% of the variance in satisfaction scores ($R^2 = 0.691$; Adjusted $R^2 = 0.551$), which indicates a moderate to strong level of explanatory power—particularly notable given the relatively small sample size.

The first significant predictor, Confidence after VCL ($\beta = 0.223$, $p = .043$), is positively associated with student satisfaction. This supports findings from the literature that highlight the central role of self-efficacy in online learning environments (Artino, 2008; Bandura, 1997). When students feel more competent in navigating collaborative digital platforms and engaging in online communication, they are more likely to perceive the experience as rewarding and meaningful. This outcome reinforces the idea that building digital confidence should be a priority in VCL design, potentially through introductory orientation sessions, scaffolded tasks, and frequent feedback.

The second significant finding is more surprising: time management skills showed a negative relationship with satisfaction ($\beta = -0.324$, $p = .021$). While initially counterintuitive, this result may suggest that students who felt they had to actively apply strong time management did so in response to demanding or poorly paced course structures. In other words, students who were successful at managing their time might still have found the workload stressful or excessive. Alternatively, it could imply that those who did not feel time-pressured may have had a more enjoyable and seamless experience overall. This interpretation aligns with research suggesting that perceived workload, not actual ability, is a strong predictor of satisfaction in online courses (Paechter et al., 2010).

Importantly, other variables—including e-tutor support, intercultural skills, collaboration skills, and pedagogical design—did not emerge as statistically significant predictors. This lack of significance does not necessarily indicate that these elements are unimportant. In fact, their high mean scores and relatively low standard deviations suggest a ceiling effect, where most respondents rated these aspects positively, leaving little variance to explain their impact on satisfaction statistically. It's possible that these elements are baseline expectations in well-executed VCL environments, and only when they are deficient do they meaningfully affect satisfaction.

Additionally, the limited sample size (N = 33) may have affected the statistical power to detect subtler effects. With a larger sample, or through the use of more nuanced qualitative measures, the influence of peer collaboration and intercultural interaction might be more clearly observed.

In sum, this regression analysis provides empirical confirmation that perceived confidence is a cornerstone of a satisfying VCL experience, while also pointing to the potential burden of time management as a factor that might detract from students' overall enjoyment. These insights have practical implications for instructional design, suggesting a need for streamlined course organization, supportive pacing, and early interventions to build digital self-efficacy.

RECOMMENDATIONS

Based on the findings of this study, several recommendations can be made to enhance student satisfaction in Virtual Collaborative Learning (VCL) environments. First, fostering student confidence is crucial. Instructors should incorporate regular feedback, provide clear instructions, and apply scaffolding strategies to help learners build their digital competence and confidence in navigating VCL platforms.

Second, it is important to balance workload and time demands. Collaborative tasks should be well-paced, with flexibility in scheduling to accommodate the diverse responsibilities and time zones of learners. Excessive time management burdens may reduce satisfaction even among capable students.

Third, although e-tutor support did not emerge as a statistically significant predictor, it demonstrated a positive trend. Institutions should therefore continue investing in the professional development of e-tutors, focusing on their readiness to facilitate online collaboration and use digital pedagogical strategies effectively.

Fourth, the design of interaction must be optimized. Meaningful engagement can be enhanced through the use of synchronous breakout rooms, peer discussion boards, and structured reflection activities. These tools help mitigate the risk of isolation and support a sense of community.

Finally, group dynamics must be actively monitored and supported. Tasks should be designed to promote equal participation and include built-in mechanisms for managing imbalances or conflicts. Facilitators should be trained to identify disengagement early and intervene in constructive ways.

CONCLUSION

This study confirms that student confidence is a central factor influencing satisfaction in VCL environments. While VCL offers flexibility, skill development, and access to collaborative learning, its success depends on the learners' perceived control, time management, and instructional design. Notably,

the negative correlation with time management points to the importance of designing courses that are mindful of student workload.

The findings suggest that satisfaction in VCL is not determined solely by the availability of technology or the presence of collaboration, but by how well these elements are integrated to support learner engagement and autonomy.

Despite these insights, the study is not without limitations. The relatively small sample size (n = 33) restricts the generalizability of the findings and may have limited the statistical power to detect subtler effects of variables such as e-tutor support, intercultural competence, and collaboration skills. Additionally, the exclusive use of self-reported quantitative data introduces potential response bias and limits deeper exploration of learners' subjective experiences.

To address these limitations, future research should aim to include larger and more diverse samples across institutions, regions, and learner demographics. Mixed-methods approaches that integrate interviews, focus groups, or learning analytics could offer a richer, more holistic view of how students experience and derive satisfaction from VCL. Longitudinal research could further reveal how student satisfaction evolves over time and in response to specific pedagogical innovations.

Overall, this study contributes to a growing body of knowledge on virtual collaboration in higher education and underscores the importance of intentional instructional design, supportive facilitation, and learner empowerment in fostering positive and satisfying VCL experiences.

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