# Annals of Human and Social Sciences
## www.ahss.org.pk

**RESEARCH PAPER**

# Impact of ICT Supported Collaborative Learning on University Students

## ¹Ayesha Akram, ²Dr. Laila Khalid and ³Ghazalah Ishrat*

1. MPhil Scholar, Department of Education, University of Management and Technology, Lahore, Punjab, Pakistan
2. Assistant Professor, Department of Education, University of Management and Technology, Lahore, Punjab, Pakistan
3. Lecturer, Department of Education, University of Management and Technology, Lahore, Punjab, Pakistan

| **Corresponding Author** | ghazalah.ishrat@umt.edu.pk |

**ABSTRACT**

This study examines the role of Information and Communication Technology (ICT) in collaborative learning among university students, focusing on engagement, cognitive skills, challenges, and demographic differences. ICT has become a vital tool in higher education, enhancing student collaboration and learning experiences. However, challenges in accessibility and usage may hinder its effectiveness. A quantitative, descriptive research design was adopted. Data were collected through a validated questionnaire from 250 students selected via convenience sampling from five private universities in Lahore. SPSS was used for data analysis, employing descriptive and inferential statistics. ICT-supported collaborative learning significantly improved student engagement but had a lesser impact on cognitive skills. Limited access to ICT tools was identified as the primary challenge, while group conflicts were the least significant barrier. No notable differences were found based on gender or education level. Improving ICT access, providing training programs, and offering institutional support can enhance collaborative learning outcomes in higher education.

| **Keywords:** | Cognitive Skills, Collaborative Learning, Information and Communication Technology (ICT), Student Engagement, University Students |

## Introduction

Information and Communication Technology (ICT) has significantly changed how education is conveyed, especially when boosting group projects among university students (Edyburn, 2020). The presence of digital tools and platforms has empowered students to collaborate more successfully and proficiently, affecting geographical restrictions and development conflicts. ICT allows communication and information sharing, allowing students to participate in group projects and discussions in physical time entitlement Scherer, Stahl et al. (2021). Collaborative learning among university students includes group work to solve problems, share knowledge, and enrich understanding through peer collaboration. It stimulates active learning, critical thinking, and teamwork, creating a self-motivated, collaborative environment. (Scherer, 2019). Incorporating ICT in collaborative learning also supports digital literacy, problem-solving, and critical thinking, further stimulated by integrating ICT into collaborative learning (Hew et al., 2018).

The impact of Information and Communication Technology (ICT) on collaborative learning influences present from traditional classroom boundaries, furnishing students with the means to interact and work together with peers and experts globally. According to Trust (2018), social media and proficient networks are pivotal in fostering worldwide collaboration, enabling students to participate in global projects and benefit from a variety of viewpoints. This global connectivity increases the learning experience and provide

equipment to students for the difficulties of a globalized job marketplace (Brown et al., 2019).

In the local setting, ICT use to help collaborative learning in university classrooms is still uncommon (Brown, 2020). Traditional teaching strategies have been significantly transformed by using information and communication technology (ICT) in the classroom, leading to more collaborative situations. However, ICT-supported collaborative learning has been energetically implemented by Pakistani universities, and the role of ICT in collaborative learning has been acknowledged with less consideration. In order to address this situation, this study will examine how ICT impacts student engagement and cognitive abilities (Edyburn, 2020). This research deals with the importance of awareness for improving educational practices in Pakistan by highlighting the benefits and problems of utilising ICT in collaborative learning. How student engagement, cognitive abilities, and challenges affect the student's using ICT during collaborative learning. This research improves Pakistani higher education quality and gets students ready for a new technologically progressive world. These difficulties must be addressed.

## Literature Review

ICT compromises a multiplicity of tools and platforms that improve engagement and communication, and it has transformed the collaborative learning of university students. The asynchronous and present-time collaboration possible by these tools endorses diversity and contribution. Today's education would not be the same without tools like Learning Management Systems (LMS), Moodle and Blackboard, as well as tools like Microsoft Teams, Zoom, Google and Slack that enable effective communication and teamwork (Redecker & Punie, 2017; Vuopala Hyvönen & Järvelä, 2019). By helping a more dynamic exchange of designs, the ability to share resources and engage with different people through these platforms and get different ideas has significantly improved the learning process in education (Campión & Compaña, 2021).

## Students Engagement and ICT- Supported Collaborative Learning

Student participation in higher education (universities) is a difficult concept with social, emotional, and cognitive features. Behavioural engagement refers to physically participating in classes where students work together, attend classes, submit assignments, work on projects, and complete coursework. Understanding these features is essential for evaluating how ICT tools can increase engagement in higher education collaborative learning settings (Backer et al., 2018). In higher education, Collaborative learning means that students work together to complete research projects to solve complex problems and challenges or create scholarly works. ICT-supported collaborative learning varieties use different digital tools and different platforms to help and improve these collaborative processes (Ansari & Khan, 2020). According to Begum and Naga (2023), societal presence the sensation of being with people- is critical for ICT-supported collaborative learning in higher education. Being desperately social can improve communication, teamwork, and student involvement. Technologies on one-touch availability, such as conferencing on video and immediate messaging, can increase social presence and foster a more dynamic and engaged learning environment by empowering real-time communication and feedback between university students (Cassells, 2018).

## Student Cognitive Skills and ICT-Supported Collaborative Learning

Academic performance is an important factor in university students' ability to apply learned content, comprehend complex theories, and use refined cognitive processes in recent times. University-level students are likely to have advanced cognitive skills like critical analysis, problem-solving, and the synthesis of multiple information sources (Bush & Grotjohann, 2020). ICT tools encourage cognitive engagement in collaborative learning

environments by providing information conception and sharing tools. For example, collaborative writing tools like Google Docs can help university students collaborate in an existing time and promote greater engagement with the material to share with other fellows (Higgins et al. (2021). These skills are necessary to succeed in universities and grow faster. Actively engaged in peer communication and the exchange of opinions are all crucial elements of the learning process in a collaborative learning environment, according to Lashari and Imran (2022). Collaborative learning is based on social constructivist theories, which highlight the importance of social collaboration in developing and integrating knowledge (Lighbown, 2020). Lev Vygotsky, a pioneer and developer in this field, suggested the Zone of Proximal Development (ZPD) concept. More experienced teachers working together in groups or with peers may help students achieve higher levels of cognitive development, according to the ZPD. Vygotsky (1978) disputed that learning is a social process and that social interaction is essential to cognitive development. According to the ZPD, students can reach a level of knowledge and skill they could not on their own when collaborating.

## Challenges in Collaborative Learning for ICT Roles

There are many challenges during information and communication and technology (ICT); when it comes to collaborative learning, different obstacles were overcome, particularly access discrepancies and technical issues. The main challenge is fewer technological tools; all students have equal access to technology, which is a significant problem that could lead to inequity in groups where they work together. Internet connections are unreliable network issues, and top-notch software and hardware may limit each group member's ability to participate completely (Hadwin et al., 2018). The digital division is more noticeable in classrooms with a diverse student body of individuals from various socioeconomic backgrounds (Bozkurt & Aydin 2023). Even when students have access to the necessary technology, technical difficulties like network problems, system crashes, and software compatibility problems can delay collaborative activities, leading to dissatisfaction and decreased productivity. The group dynamics in ICT-supported collaboration led to conflicts among students. All students must have unbiased access to technology and receive suitable technical assistance and training for collaborative learning to flourish in ICT roles (Fenyuesi, 2020). Teachers not having enough training on ICT use is a big challenge. The success of collaborative learning in ICT depends on effective communication and conflict resolution, even though they present numerous challenges. Different levels of ICT skills among students make collaborative learning hard to manage (Ombajo & Olanrewajy, 2024). According to Ergado (2022), students often lack the skills necessary to fluster engagements in a way that fosters group unity and frustration. Effective communication and conflict resolution skills training is necessary to ensure productive collaboration and maintain group cohesion.

## Theoretical Framework

The study is based on two theories.

1. Vygotsky's Socio-cultural Theory

2. Activity Theory

Fig 1: Theoratical Framework
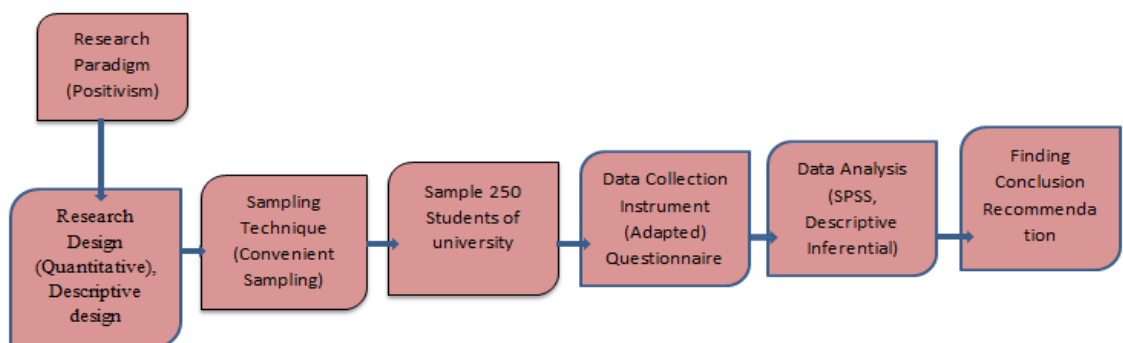
**Research Methodology**



Fig 2: Methodology & Procedure of the study

This research adopts a positivist paradigm, employing a quantitative and descriptive design to examine the research objectives systematically. The population comprised students of private universities in Lahore city. The study utilizes a convenience sampling method to gather data from 250 university students from five private universities in Lahore. The main instrument for gathering data is an adapted questionnaire that gathers answers relevant to the study subject. With the support of SPSS software, the collected data is examined, and descriptive and inferential statistical methods are used to interpret the findings efficiently. The analysis results include conclusions, recommendations, and findings that shed light on the function of ICT in collaborative learning.

**Results and Discussion**

The Statistical Package for Social Sciences (SPSS) was used to analyse the data using both descriptive and inferential statistics (SPSS). An independent sample t-test and frequency were employed on the demographic variables of gender and level of education (SECTION-A). The mean and standard deviation of the variable responses were computed to rank how well ICT impacted student engagement and cognitive abilities in collaborative learning. The mean scores also found the most significant and least challenging aspect of using ICT in collaborative learning (SECTION-B).

**Table 1**
**Independent sample t-test on the basis of Gender**

| Gender | N | Mean | SD | Df | T | Sig |
|--------|-----|-------|-------|-----|------|------|
| Male | 100 | 74.62 | 11.52 | 248 | .548 | .027 |
| Female | 15 | 73.68 | 14.56 | | | |

*P> .05 Level of Significance

The table indicates that the mean and standard deviation for males are (M=74.62; S.D=11.52), whereas the mean and standard deviation for females are (M=73.68; S.D=14.56). The results reveal that the t-value is .548, and the significant value is .027, which is greater than 0.05. It shows that no significant difference was found on the variables at the base of gender, male and female.

**Table 2**
**Independent sample t-test at the Level of Education**

| Level of Education | N | Mean | SD | Df | T | Sig |
|--------------------|-----|--------|-------|-----|--------|------|
| Undergraduate | 128 | 72.04 | 14.44 | 248 | -2.499 | ..067 |
| Postgraduate | 122 | 76.163 | 11.94 | | | |

*P> .05 Level of Significance*

The table indicates that undergraduates' mean and standard deviation are (M=74.04; S.D.=11.14.44), whereas postgraduates' mean and standard deviation are (M=76.16; S.D=11.94). The results reveal that the t-value is -2.499, and the significant value is .067, which is greater than 0.05. It shows that no significant difference was found in the variables at the base of the level of education between undergraduates and postgraduates.

**Table 3**
**The mean and standard deviation of the responses of the variables**

| Variables | Mean Average |
|-----------|--------------|
| ICT role in collaborative Learning on student engagement | 3.73 |
| ICT's role in collaborative learning on cognitive skills | 3.66 |

According to the results, the ICT role in collaborative learning is more effective in student engagement due to the mean average value of 3.73. The ICT role in collaborative learning on cognitive skills is also practical but less effective in student engagement, with a mean average value of 3.66.

**Table 4**
**Mean and stander deviation of barrier and challenge in using ICT**

| The challenge of using ICT in collaborative learning | Mean | *SD* |
|------------------------------------------------------|------|------|
| Using ICT in collaborative learning is "Group dynamics in ICT-supported collaborative learning leads to conflicts among students | 2.90 | 1.49 |
| Limited access to ICT tools makes collaborative learning less effective | 4.32 | .91 |

The least significant barrier and challenge in variable 3, Challenges of using ICT in collaborative learning, is "Group dynamics in ICT-supported collaborative learning leads to conflicts among students, and its mean score is (2.90). The biggest challenge is that "Limited access to ICT tools makes collaborative learning less effective, and its mean score is (4.32).

**Discussion**

This study examined the role of ICT in collaborative learning among university students, focusing on engagement, cognitive skills, and associated challenges. Findings revealed that ICT positively influences student engagement by increasing interest, focus, motivation, and participation. It enhances understanding of complex topics, communication skills, and confidence while supporting independent work and timely task completion. However, its impact on peer engagement was neutral.

ICT was also reported to improve cognitive skills by enhancing reasoning, information processing, and visual understanding. Students noted better retention, higher grades, and improved problem-solving abilities, fostering critical thinking and real-life application of knowledge.

Despite these benefits, barriers were identified, including limited access to ICT tools, varying skill levels, insufficient teacher training, high costs, unreliable internet, and technical issues. Psychological challenges, such as reduced motivation and competition, were also noted. Limited access to ICT tools emerged as the most significant challenge, while group dynamic conflicts were the least impactful.

No significant differences were observed in study variables based on gender or education level. Overall, the findings highlight ICT's positive role in enhancing engagement and cognitive skills but addressing access and infrastructure challenges is crucial for maximizing its potential in collaborative learning.

## Conclusion

It has been concluded that ICT's role in collaborative learning is more effective in promoting student engagement and less effective in improving students' cognitive skills. Limited access to ICT tools is the biggest challenge in ICT-supported collaborative learning. On the other hand, Group conflicts in ICT-supported collaborative learning are the least significant barrier university students face. No significant difference was found between gender and education level in the study variables.

## Recommendations

- The following are the recommendations of the study:
- Educational institutions may ensure that ICT tools are readily available and accessible in classrooms.
- Training workshops may be conducted for teachers and students to learn how to use ICT tools effectively in collaborative learning.
- Policy makers may ensure the availability of ICT tools in educational institutions, and funds may be allocated for this purpose. Enhancing access to ICT resources could significantly improve collaborative and academic learning outcomes.
- University authorities may ensure improving access to ICT tools and infrastructure for all students to ensure effective collaborative learning. This includes providing necessary equipment and ensuring reliable internet connectivity.

**References**

Ansari, J. & Khan, N. A. (2020). Exploring the role of social media in collaborative learning the new domain of learning. *Smart Learning Environments, 7*(1), 1- 16

Backer, J. M., Miller, J. L., & Timmer, S. M. (2018). *The effects of collaborative grouping on student engagement in middle school students* (Master's thesis). https://sophia.stkate.edu/maed/270

Begum, R., & Naga Dhana Lakshmi, R. (2023). ICT-based collaborative learning approach: Enhancing students' language skills. In A. Kumar, G. Ghinea, S. Merugu, & T. Hashimoto (Eds.), *Proceedings of the International Conference on Cognitive and Intelligent Computing* (pp. 11–18.

Bozkurt, B., & Aydin, S. (2023). The Impact of Collaborative Learning on Speaking Anxiety Among Foreign Language Learners in Online and Face-to-Face Environments. *International Journal of Virtual and Personal Learning Environments, 13*(1-16).

Brown, M. (2020). The Role of ICT in Higher Education. *Journal of Educational Technology, 35*(2), 115-130.

Brown, M., Costello, E., Donlon, E., & Nic Giolla Mhichíl, M. (2019). A strategic response to MOOCs: How one European university is approaching the challenge. *International Review of Research in Open and Distributed Learning, 16*(6), 98-115.

Bush, A., & Grotjohann, N.(2020). Collaboration in teacher education: A cross-sectional study on future teachers' attitudes towards collaboration, their intentions to collaborate and their performance of collaboration.*Teaching and Teacher Education,88*, 102968.

Cassells, D. (2018). *Integrating collaborative learning in policy and practice: CO-LAB's conclusions and recommendations*. European Schoolnet.

Edyburn, D. L. (2020). Assistive technology and universal design for learning: Two sides of the same coin. *Handbook of Research on Human Development in the Digital Age,* 201-224.

Ergado, A. A., Desta, A., & Mehta, H. (2022). Contributing factors for the integration of information and communication technology into Ethiopian higher education institutions teaching-learning practices. *International Journal of Education and Development using Information and Communication Technology, 18*(1), 275- 292

Fenyvesi, K. (2020). English learning motivation of young learners in Danish primary schools. *Language Teaching Research, 24*(5), 690-713.

Hadwin, A. F., Bakhtiar, A., & Miller, M. (2018). Challenges in online collaboration: Efects of scripting shared task perceptions. *International Journal of ComputerSupported Collaborative Learning, 13*, 301–329.

Hew, K. F., Lan, M., Tang, Y., Jia, C., & Lo, C. K. (2018). Where is the ̳theory' within the field of educational technology research? *British Journal of Educational Technology, 50*(3), 956-971.

Imran, Q., Kazimi, A. B., & Lashari, A. A. (2022). Examining the impact of extrinsic and intrinsic barriers to adopting information communication technology in classroom teaching in intermediate (K 12) colleges of Karachi, Pakistan.*Journal of Positive School Psychology,* 2458-2478.

Lightbown, P., & Spada, N. (2020). *How Languages are Learned* (4th ed.). Oxford University Press.

Ombajo, M. E., & Olanrewaju, M. K. (2024). The adoption of ICT tools for collaborative learning among students in Kenyan higher education institutions. *Seybold Report Journal, 19*(7), 71-95.

Redecker, C., & Punie, Y. (2017). *Digital Competence Framework for Educators (DigCompEdu).* Publications Office of the European Union.

Sánchez-Cruzado, C., Santiago Campión, R., & Sánchez-Compaña, M. T. (2021). Teacher Digital Literacy: The Indisputable Challenge after COVID-19. *Sustainability, 13*(4), 1858.

Scherer, R., Siddiq, F., & Tondeur, J. (2019). The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education. *Computers & Education, 128*, 13-35.

Stahl, G., Koschmann, T., & Suthers, D. (2021). Computer-Supported Collaborative Learning: An Historical Perspective. In R. K. Sawyer (Ed.), Cambridge 112 *Handbook of the Learning Sciences* (pp. 409-426). Cambridge University Press

Trust, T. (2018). How teacher professional learning and collaborative engagement through social media supports and enhances the professional learning community. *Professional Development in Education, 40*(1), 64-85

Vuopala, E., Hyvönen, P., & Järvelä, S. (2019). Interactional features in successful collaborative learning in virtual learning environments. *Active Learning in Higher Education, 20*(1), 21-34.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Harvard University Press.