

Association between ICT-Based Learning Practices and Academic Engagement of Undergraduate University Students

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ABSTRACT: The aim of this study was to explore the relationship between ICT-Based Learning Practices and Academic Engagement of undergraduate students in the university. A quantitative survey research design was used for data collection. Four hundred undergraduate students were selected using a multi-stage sampling procedure. Correlation and regression analysis were used for analyzing data. The results showed that there was a moderate positive correlation between ICT-Based Learning Practices and Academic Engagement ($r = .594$, $p < .01$) and a significant positive correlation between them ($r = .607$, $p < .01$). The results of the regression analysis showed that the ICT-based learning practice significantly predicted the students' academic engagement and accounted for 35.2% of the variance of academic engagement. The findings indicate that the integration of ICT resources in meaningful activities can foster students' behavioral, emotional, cognitive, and collaborative engagement. The study concludes by recommending that HEIs not only make technology available but also ensure its effective pedagogical use and integration in order to offer students active and meaningful learning experiences.

KEYWORDS: ICT-Based Learning Practices, Academic Engagement, University Students, Higher Education, Digital Learning, Undergraduate Students

Introduction

The emergence of Information and Communication Technology (ICT) in the higher education context has revolutionized the way teaching and learning are done in relation to the use of digital and interactive approaches. ICT can create learning spaces that are flexible, collaborative, and student-centered to enhance student engagement. Digital tools like Learning Management System (LMS), online classes, educational apps, and multimedia resources have become indispensable in the education and learning context in universities. These technologies enable learners to access academic content, interact with other students, and engage with learning and content in innovative digital formats (Heidari et al., 2021; Zhao et al., 2021).

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The role of teacher and student in higher education has been transformed by the advent of ICT. This time, the teacher is no longer the person who gives all the knowledge, but becomes a facilitator, guiding the student to explore knowledge using information technology, and the student is an active participant in the learning process. This change promotes independence and self-directed learning, enabling students to learn at their own speed. The effectiveness of these digital tools is, however, very closely related to the level of engagement with the student. Behavioral, emotional, and cognitive engagement are key components of academic engagement and serve as a critical link between technology use and learning outcomes (Kosel et al., 2024). Online quizzes, discussion boards, and collaborative projects help to motivate students and result in a more participatory learning environment. Hence, the relationship between ICT-based learning practices and academic engagement must be understood, particularly within higher education institutions where the digital transformation is still having an impact on the learning experiences of students.

Objective of the Study

- ▶ To determine the relationship between ICT-based learning practices and academic engagement of undergraduate students of the University of Sargodha.

Hypothesis

- ▶ The relationship between academic engagement of University of Sargodha undergraduate students and the use of ICT-based learning practices is significant.

Literature Review

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is a popular theory that explains the process and reasons behind a person's acceptance of a technology. The TAM was first developed by Fred Davis (1989) and is based on human behavior and information systems theories, which makes it one of the most popular models to understand technology acceptance in the educational environment. The use of a technology is not a random process; it is influenced by the users' beliefs and attitudes towards the technology, TAM states. According to TAM, two beliefs lead to the intention to use and later to the adoption of a technology. Perceived Usefulness (PU): This is the degree to which the user thinks that the technology will increase his/her efficiency in using the product. For students, increasing their use of an ICT tool is likely to be positive as they feel it will improve their learning or assist in completing their academic tasks. Perceived Ease of Use (PEOU): The ease of use a user thinks of the technology. When students believe that a learning technology is easy to use, they are more inclined to have positive attitudes toward the technology and are more likely to interact with it.

A student's attitude towards the use of the technology is determined by these beliefs, which in turn affect their behavioral intention to use the technology. This behavioral intention, in turn, is a predictor of actual technology use in the academic context.

Self-determination Theory (SDT)

Self-determination theory (SDT) places a strong emphasis on the part that basic psychological requirements play in the growth of self-motivation and wellbeing. First developed by Deci and Ryan to describe how individuals internalize rules imposed on them from outside and how different motivational styles are related to engagement, performance, and learning (Deci & Ryan, 1985; Ryan & Deci, 2000). Three basic psychological demands are identified by the theory as being necessary to promote intrinsic motivation and optimal functioning. When someone is in an activity, they feel like they are operating their own mind and they feel free. Competence is the desire to feel

competent in what one is doing and to feel like one has mastery. Relatedness – a feeling of belonging, of being cared for and connected with others (Ryan & Deci, 2000). Ryan and Deci (2017) further emphasized that the satisfaction of these three basic psychological needs promotes autonomous motivation, well-being, and sustained academic engagement among students. SDT has been extensively utilized in the educational environment as a framework to describe students' engagement and motivation. Research has found that autonomy-supportive environments (choice, encouragement, and meaningful justification) increase the likelihood that students will be autonomously driven and will be more involved with their studies (Niemic & Ryan, 2009). These can help students internalize academic objectives and keep them motivated despite challenges, leading to long-term success and mental health (Guay et al., 2008).

Relationship between ICT-Based Learning Practices and Academic Engagement

Previous studies show a positive correlation between ICT-based learning strategies and students' academic engagement. The flexibility, collaborative nature, and student-centeredness of learning environments can be achieved with the support of ICT, and thus can motivate students to actively participate in learning activities. The use of learning management systems, online learning platforms, multimedia and digital communication tools enhances students' engagement in behavioural, emotional, cognitive, and collaborative aspects (Abbasi et al., 2023; Balalle, 2024).

If well integrated into teaching methods, digital learning technologies promote engagement, collaboration, and rich learning experiences, according to Nkomo et al. (2021). In a similar vein, Wang and Wang (2023) discovered that instructional ICT tools greatly raise student engagement, which eventually leads to improved academic achievement. Likewise, Sanfo (2023) revealed that the regular use of ICT in the classroom enhances student engagement and learning outcomes with the provision of individual and group learning.

Bond and Bedenlier (2019) further highlighted that educational technology promotes students' behavioral, emotional, and cognitive engagement when it is effectively integrated into teaching and learning activities. They emphasized that technology alone cannot improve learning outcomes; rather, its success depends on meaningful pedagogical integration, active student participation, and well-designed learning experiences. Therefore, the effective use of ICT can create engaging learning environments that encourage students to participate actively in academic activities (Bond & Bedenlier, 2019). In addition, recent studies have shown that educational technology is most effective when integrated with appropriate pedagogical strategies rather than merely providing access to digital tools (Akintayo et al., 2024).

Liu et al. (2022) reported that ICT-supported teaching strategies positively influence students' academic engagement by encouraging active participation, collaboration, and interactive learning. Their findings suggest that integrating digital technologies into classroom instruction improves students' motivation and involvement in learning activities, leading to a more engaging educational experience (Liu et al., 2022). Overall, the findings indicate that the implementation of ICT-based teaching methods is definitely able to significantly increase the academic engagement of students. But, there is a lack of empirical evidence on this correlation from Pakistani undergraduate university students. Thus, the relation between academic engagement and the use of ICT for learning practices among Sargodha University undergraduate students was the purpose of the present study.

Methodology

The research design is quantitative; the survey method of data collection was used to find out the association between ICT-based learning practices and academic engagement of undergraduate university students.

Population of the Study

The population of the study comprises undergraduate students enrolled in the University of Sargodha.

Sample and Sampling Technique

A multistage sampling approach was adopted for this study to ensure adequate representation from different academic disciplines. At the first stage, stratified sampling was applied by dividing the population into four faculties: Faculty of Sciences, Faculty of Social Sciences, Faculty of Arts and Humanities, and Faculty of Business and Management. These faculties served as strata for the study.

At the second stage, two departments from each faculty were selected purposively based on their accessibility and relevance to the research topic. Although participants were selected from different departments, the data were analyzed at the faculty level.

Students from all semesters (1st to 8th) were included in the study to obtain diverse perspectives regarding their academic experiences. Participants were approached in their respective departments during scheduled class times. At the final stage, convenience sampling was used to select 50 students from each selected department. Consequently, the total sample consisted of 400 students, with equal representation from all four faculties.

Overall, the use of stratified, purposive, and convenience sampling techniques enhanced both the diversity and feasibility of the data collection process.

Inferential Statistics

Table 1

Correlation between ICT-Based Learning Practices and Academic Engagement (N = 400)

Variables	1	2
1. ICT-Based Learning Practices	1	.594**
2. Academic Engagement	.594**	1

Note: $p < .01$

Table 1 gives the correlation between ICT-based learning practices and academic engagement. At the level of 0.01, the analysis shows that the correlation ($r = .594$, $p = .000$) was moderate and significantly greater. This implies that the more ICT-based learning practices, the more academic engagement among the students.

The intensity of the correlation implies that the successful application of the ICT tools in the learning settings results in favorable behavioral, emotional, cognitive, and collaborative interaction among students. The more often students use digital technologies as academic resources, the more likely they are to be more engaged, motivated, and involve their brains in their studies. In general, the results demonstrate that ICT integration is a significant factor in achieving active and meaningful student engagement in schooling.

Table 2

Regression Analysis of ICT-Based Learning Practices Predicting Academic Engagement (N = 400)

Model Summary

Model	R	R ²	Adjusted R ²	Std. Error of the Estimate
1	.594	.352	.351	14.26704

Table 3*ANOVA*

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	44076.108	1	44076.108	216.539	.000
Residual	81012.290	398	203.548		
Total	125088.398	399			

Table 4*Coefficients*

Model	B	Std. Error	Beta	t	Sig.
(Constant)	28.282	4.007	—	7.058	.000
ICT-Based Learning Practices	.990	.067	.594	14.715	.000

Table 2 presents the results of the simple linear regression model analysis for the effect of the factors that relate to the use of ICT-based learning practices on academic engagement. The model summary indicates that ICT-based practices of learning is moderately positively correlated with academic engagement ($R = .594$). The coefficient of determination ($R^2 = .352$) shows that the variance of academic engagement can be explained by ICT-based learning practices by almost 35.2%. The fact that the adjusted R^2 (.351) is stable proves this point. The result of the standard error of the estimate was (14.26704), which represented the mean error in the prediction.

The ANOVA findings indicate that the regression model is significant ($F = 216.539$, $p = .000$) and thus, ICT-based learning practices were found to be a significant predictor of academic engagement.

Based on the second resulting coefficient, the influence of ICT-based learning practices on academic engagement is quite significant and positive ($B = .990$, $Beta = .594$, $t = 14.715$, $p = .000$). ICT-based learning practices will increase academic engagement by a factor of .990 per unit increase in ICT-based learning practices. Overall, the findings show that using an ICT-based learning approach has a positive impact on the academic engagement of students.

Conclusion

The research in this study explored the learning practices with the use of ICT and the relationship between learning practices and learning engagement of university students at the undergraduate level. The results indicate that students demonstrated a moderate level of ICT-based learning practices in general, whereas their academic participation is high in the context of behavioral, emotional, and cognitive engagement and peer collaboration. According to a major finding, ICT-based learning practices have a strong positive relationship with academic engagement, and ICT-Based Learning Practices are a significant predictor of academic engagement. Therefore, a significant portion of the variance in academic engagement among students can be accounted for. The results obtained may be connected to the theoretical conception that meaningful participation, motivation, and cognitive engagement are possible when learning activities and collaboration are carried out in the use of ICT tools in ICT-supported learning environments. On the whole, the paper finds that higher education institutions must consider enhancing the quality of ICT use to enhance academic engagement, rather than just focusing on its access and use frequency.

Discussion

The present research focused on studying the relationship between the use of ICT for learning activities and academic engagement of undergraduate students at the university. There is relatively good agreement with the results that ICT can help in developing flexible and collaborative learning environments in classrooms, which can be student-centred (Kumar and Priyanka, 2023).

Academic engagement and its connection to the use of technology, particularly in the context of behavioral, emotional, and cognitive engagement, is one of the most critical links between learning outcomes and technology use. From a practical point of view, the results of this study directly contribute to the Technology Acceptance Model (TAM), because the involvement that students have with these ICT tools highly depends on their perception of usefulness (Perceived Usefulness) and ease of use (Perceived Ease of Use) in relation to their academic work. Moreover, the findings are consistent with Self-Determination Theory (SDT), as effective practices with ICTs meet the basic psychological needs of autonomy, competence, and digital relatedness with peers in relation to student learning, leading to intrinsic motivation and academic involvement. The study also reveals, however, that the availability of technology does not necessarily ensure successful incorporation into educational activities, further reinforcing theoretical considerations that the pedagogical value of technology is closely related to its design and strategic pedagogical integration into activities, and not merely its physical access (Chai et al., 2014; Msafri et al., 2023). It is noteworthy that findings also suggest there is limited use of these tools by digitally competent students for higher-order cognitive processing, such as analysing, synthesising, or problem-solving. Student academic engagement, then, does not occur if the ICT tools are not designed to encourage active critical thinking instead of passive learning of information (Chai et al., 2014), and it is clearly more important to have a pedagogical alignment that is purposeful than to have access to ICT tools.

Recommendations

Based on the findings, the following recommendations were made;

1. Systematic training sessions may be held to increase students' academic ICT digital literacy and intentional use of ICT in learning activities.
2. Interactive activities to promote higher-order thinking skills and reduce passive use may be integrated into the instructional design of the LMS.

References

- Abbasi, M., Ghamoushi, M., & Mohammadi Zenouzagh, Z. (2023). EFL learners' engagement in online learning context: Development and validation of potential measurement inventory. *Universal Access in the Information Society*, 23(3), 1467-1481. <https://doi.org/10.1007/s10209-023-00993-0>
- Akintayo, O. T., Eden, C. A., Ayeni, O. O., & Onyebuchi, N. C. (2024). Evaluating the impact of educational technology on learning outcomes in the higher education sector: A systematic review [Review of Evaluating the impact of educational technology on learning outcomes in the higher education sector: A systematic review]. *Open Access Research Journal of Multidisciplinary Studies*, 7(2), 52. <https://doi.org/10.53022/oarjms.2024.7.2.0026>
- Balalle, H. (2024). Exploring student engagement in technology-based education in relation to gamification, online/distance learning, and other factors: A systematic literature review. *Social Sciences & Humanities Open*, 9, 100870. <https://doi.org/10.1016/j.ssaho.2024.100870>
- Bond, M., & Bedenlier, S. (2019). Facilitating student engagement through educational technology: Towards a conceptual framework. *Journal of Interactive Media in Education*, 2019(1). <https://doi.org/10.5334/jime.528>
- Chai, C. S., Koh, E., Lim, C. P., & Tsai, C. (2014). Deepening ICT integration through multilevel design of technological pedagogical content knowledge. *Journal of Computers in Education*, 1(1), 1-17. <https://doi.org/10.1007/s40692-014-0002-1>
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340. <https://doi.org/10.2307/249008>
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Springer.
- Guay, F., Ratelle, C. F., & Chanal, J. (2008). Optimal learning in optimal contexts: The role of self-determination in education. *Canadian Psychology / Psychologie canadienne*, 49(3), 233-240. <https://doi.org/10.1037/a0012758>
- Heidari, E., Mehrvarz, M., Marzooghi, R., & Stoyanov, S. (2021). The role of digital informal learning in the relationship between students' digital competence and academic engagement during the COVID-19 pandemic. *Journal of Computer Assisted Learning*, 37(4), 1154-1166. <https://doi.org/10.1111/jcal.12553>
- Liu, S., Zaigham, G. H., Rashid, R. M., & Bilal, A. (2022). Social media-based collaborative learning effects on student performance/Learner performance with moderating role of academic self-efficacy. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.903919>
- Michel, S., Kosel, C., Seidel, T., & Förster, M. (2026). Exploring the dynamic interplay of cognitive load and emotional arousal by using multimodal measurements: Correlation of pupil diameter and emotional arousal in emotionally engaging tasks. *Frontline Learning Research*, 13(4). <https://doi.org/10.14786/flr.v13i4.1663>
- Msafiri, M. M., Kangwa, D., & Cai, L. (2023). A systematic literature review of ICT integration in secondary education: What works, what does not, and what next? *Discover Education*, 2(1). <https://doi.org/10.1007/s44217-023-00070-x>
- Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom. *Theory and Research in Education*, 7(2), 133-144. <https://doi.org/10.1177/1477878509104318>
- Nkomo, L. M., Daniel, B. K., & Butson, R. J. (2021). Synthesis of student engagement with digital technologies: a systematic review of the literature. *International journal of educational technology in higher education*, 18(1), 34. <https://doi.org/10.1186/s41239-021-00270-1>

- Priyanka, K., & Kumar, A. (2013). Understanding the Evolution of Technology Acceptance Model. *International Journal of Advanced Research in Computer Science and Management Studies*, 6, 144-148. <https://www.scirp.org/reference/referencespapers?referenceid=3043717>
- Ryan, R. M., & Deci, E. L. (2017). *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*. New York, NY: Guilford Press.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68-78. <https://doi.org/10.1037//0003-066x.55.1.68>
- Sanfo, J. M. (2023). Examining student ICT use and learning outcomes: Evidence from Japanese PISA data. *Computers and Education Open*, 4, 100141. <https://doi.org/10.1016/j.caeo.2023.100141>
- Wang, Y., & Wang, Y. (2023). Exploring the relationship between educational ICT resources, student engagement, and academic performance: A multilevel structural equation analysis based on PISA 2018 data. *Studies in Educational Evaluation*, 79, 101308. <https://doi.org/10.1016/j.stueduc.2023.101308>
- Zhao, Y., Pinto Llorente, A. M., & Sánchez Gómez, M. C. (2021). Digital competence in higher education research: A systematic literature review. *Computers & Education*, 168, 104212. <https://doi.org/10.1016/j.compedu.2021.104212>