

Pedagogical Affordances of Digital Technologies in Higher Education

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Abstract – This study examines the pedagogical affordances of digital technologies in higher education, with a focus on how these tools support teaching and learning practices in Austrian universities. Conducted between February and April 2024, the research explores the ways digital technologies enhance instructional flexibility, student engagement, collaborative learning, and access to educational resources. The study also considers how lecturers and students perceive the role of digital platforms in facilitating interactive, inclusive, and learner-centered environments. Findings indicate that digital technologies offer significant pedagogical value by enabling personalized learning pathways, timely feedback, multimodal content delivery, and more adaptive forms of communication between instructors and students. However, the study also highlights persistent challenges related to digital readiness, pedagogical integration, and unequal levels of technological competence. These results suggest that the effectiveness of digital technologies in higher education depends not only on infrastructure availability but also on educators' pedagogical strategies and institutional support systems. The study contributes to the growing discussion on digital transformation in higher education by emphasizing the need to align technological adoption with sound pedagogical design.

Keywords: digital technologies; higher education; pedagogical affordances; student engagement; instructional flexibility; digital transformation

Article info: Date Submitted: 12/04/2023 | Date Revised: 13/05/2023 | Date Accepted: 18/05/2023

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Introduction

Digital technologies have become an increasingly integral part of higher education [1], [2], [3], reshaping how teaching, learning, communication, and assessment are organized across universities. In contemporary higher education systems [4], digital platforms [5], learning management systems [6], collaborative applications [7], and multimedia resources are no longer peripheral tools; rather, they have become embedded in everyday academic practice, blurring the boundaries between face-to-face, blended, and online learning environments. At the same time, international evidence shows that the educational value of technology is not automatic. While digital technologies can improve access to learning resources and enable more personalised and flexible forms of education, their impact depends on meaningful connectivity, pedagogically informed implementation, and alignment with learning outcomes rather than on technology adoption alone.

Within this broader transformation, the concept of pedagogical affordances offers an important analytical lens for understanding what digital technologies actually make possible in teaching and learning [8]. Rather than treating technology as inherently beneficial, an affordance-based perspective focuses on the possibilities that digital tools open up for interaction, collaboration, feedback, multimodal representation, learner autonomy, and instructional adaptability. Recent scholarship on digital pedagogy argues that the central issue is not simply whether technology is present in higher education, but how it is pedagogically framed to support learner-centred and sustainable educational practices. This perspective is especially relevant in higher education, where instructional quality increasingly depends on the thoughtful integration of digital resources into disciplinary and institutional contexts [9].

The Austrian context provides a particularly relevant setting for such an investigation. Austria has shown strong performance in digital skills development compared with the European Union average, and national discussions have increasingly emphasized the educational importance of digital competence [10]. At the same time, Austrian higher education policy has already moved beyond emergency digitalisation toward questions of quality, sustainability, and pedagogical integration. The recommendations of the Austrian Higher Education Conference explicitly frame digital teaching scenarios as an appropriate complement to traditional teaching, while stressing that digital formats should be adapted to content, setting, and target group, with student understanding remaining the primary educational goal. These recommendations also emphasize student-centred interactive formats, digital literacy, infrastructure, and institutional framework conditions as core elements of quality enhancement in Austrian higher education.

Despite the growing literature on digital pedagogy, an important research gap remains. Existing studies have mapped broad trends in digital pedagogy and proposed conceptual frameworks for technology-enhanced learning, yet the literature still points to the need for more context-sensitive empirical work that examines how digital pedagogies are enacted within specific higher education settings and shaped by institutional, national, and policy conditions. In other words, there is still insufficient understanding of how the pedagogical affordances of digital technologies are experienced in practice by lecturers and students in particular university contexts, especially in European settings where digital transformation is increasingly linked to teaching quality, inclusion, and flexibility [11].

This gap is especially significant in the post-pandemic period, when digital technologies are no longer used only as emergency substitutes for classroom teaching but as routine elements of academic delivery. OECD analyses note that higher education institutions are increasingly integrating digital tools across teaching, learning, research, and administration, yet many systems still face limitations in resources, institutional capacity, and policy design for highly digitalised learning environments [12]. Similarly, Austrian higher education discussions emerging from the pandemic highlighted both the challenges of rapid digital transition and the need to systematically reflect on lessons learned in order to improve future teaching and learning processes without the constraints of crisis conditions. These developments make the period from February to April 2024 a timely window for investigating how digital technologies were being pedagogically used in regular higher education practice in Austria.

Against this background, the present study examines the pedagogical affordances of digital technologies in higher education in Austria during February–April 2024. It aims to explore how digital tools support instructional flexibility, student engagement, collaboration, feedback, and access to learning resources, while also considering the pedagogical and institutional constraints that may limit their effective use. By focusing on a specific national and temporal context, this study contributes to the literature by offering an empirically grounded account of how digital technologies function as pedagogical enablers in higher education, moving beyond general claims about digital transformation toward a more nuanced understanding of technology-in-practice within university teaching and learning.

Related Works

Research on digital technologies in higher education has expanded considerably over the last few years, especially in response to the broader digital transformation of universities and the pedagogical shifts accelerated by the pandemic. A recent mapping of digital pedagogies in higher education shows that the field has developed around themes such as digitalisation, university teaching, and educational quality, while also indicating that one of the major future challenges is achieving a more flexible and sustainable pedagogical renewal rather than merely increasing technology use. This suggests that the central concern in current scholarship is no longer the presence of digital tools alone, but the educational value they generate when meaningfully integrated into teaching and learning processes [13], [14].

Earlier literature reviews also demonstrate that the pedagogical use of digital technologies in higher education has often been dominated by institutional learning management systems, information-sharing tools, and technologies that support access to learning materials. Pinto and Leite found that digital technologies generally had a positive influence on students' learning processes, particularly by promoting active engagement and participation inside and outside the classroom. However, the same review also showed that such technologies were more frequently used to support transmissive teaching practices and individual access to information than to foster collaborative and cooperative learning. Their findings further indicate that many digital practices were embedded in blended or flipped learning settings, pointing to the importance of pedagogical design in shaping how technology is used [15].

More recent work has continued to emphasize the relationship between technology use and student engagement. A systematic review by Balalle et al. identified three recurring clusters in the literature: gamification and engagement, online or distance learning and engagement, and technology-enhanced engagement more broadly. At the same time, Mhlongo et al. argue that the affordances of smart digital technologies include multimodality, asynchronicity [16], and new forms of engagement, while also opening possibilities for more inclusive learning environments. Yet these authors also stress that digitalisation introduces new complexities and should not be treated as a straightforward educational solution. Together, these studies show that digital technologies can enrich higher education, but their benefits remain dependent on context, pedagogy, and implementation quality [17].

At the institutional level, European higher education research has highlighted both the enablers and the barriers associated with digitally enhanced learning and teaching [18]. The European

University Association identifies proactive participation by staff and students, professional development, institutional strategies, and investment in infrastructure as major enablers, while lack of staff resources, lack of funding, and difficulties in building coordinated institutional approaches remain key barriers. In parallel, the EUROSTUDENT report on digitalisation of teaching, learning, and student life notes that broad empirical comparisons between digital and in-person formats and their relationship to academic success are still limited. The same report shows strong student demand for digital provision of study materials, administrative services, and live or recorded courses, but also reports comparatively low satisfaction in Austria for several digital service dimensions, including live online courses [19]. These findings indicate that institutional digital provision does not automatically translate into positive student experience, reinforcing the need for more context-specific empirical inquiry.

In the Austrian context, policy and strategic documents have increasingly framed digitalisation as a quality issue rather than a purely technological one. The Austrian Higher Education Conference established a working group on digital teaching, learning, and eAssessment with the explicit aim of safeguarding and improving the quality of teaching, learning, and assessment in Austrian higher education, and its recommendations emphasize the optimal integration of digital elements into teaching and learning processes as well as the need for structured development of digital skills across educational careers. Similarly, Austria's "Universities and Digital Transformation 2030" strategy states that digitalisation is not an end in itself and should help universities better respond to individual circumstances and needs [20]. Taken together, these studies and policy frameworks show that although the literature has identified many pedagogical affordances of digital technologies, there is still a need for empirical research that examines how these affordances are realized in specific higher education contexts, particularly in post-pandemic Austria.

Method

Research Design

This study employed a mixed-methods explanatory design to examine the pedagogical affordances of digital technologies in higher education. The quantitative phase was conducted first to identify dominant patterns in students' and lecturers' perceptions of digital technologies, followed by a qualitative phase to obtain deeper explanations of how such technologies supported teaching and learning practices in Austrian higher education institutions. This design was chosen because the concept of pedagogical affordances involves not only measurable dimensions such as flexibility, engagement, and accessibility, but also context-dependent experiences that are better captured through qualitative inquiry.

The study was conducted in Austria between February and April 2024, a period in which digital technologies had already become integrated into routine university practices rather than functioning merely as emergency teaching tools. The combination of survey and interview data allowed the study to capture both the breadth and depth of the phenomenon.

Research Setting and Participants

The study involved participants from higher education institutions in Austria, including universities and universities of applied sciences. A purposive sampling strategy was used to recruit respondents who had direct experience with the use of digital technologies in teaching and learning during the 2024 academic period.

The quantitative sample consisted of 250 participants, including 210 students and 40 lecturers from different academic disciplines. For the qualitative phase, 15 participants were selected from the survey respondents for follow-up semi-structured interviews based on their willingness to participate and the variation in their survey responses. Table 1 presents the participant profile used in this study.

Table 1. Participant Profile

| Category | Group | Number | Percentage (%) |
|--------------|---------------|------------|----------------|
| Students | Undergraduate | 138 | 55.2 |
| Students | Master's | 72 | 28.8 |
| Lecturers | Full-time | 28 | 11.2 |
| Lecturers | Part-time | 12 | 4.8 |
| Total | | 250 | 100.0 |

Research Instruments

Two instruments were used in this study: a structured questionnaire and a semi-structured interview guide.

The questionnaire was designed to measure perceived pedagogical affordances of digital technologies in higher education across six dimensions:

1. Instructional Flexibility
2. Student Engagement
3. Collaborative Learning
4. Feedback Efficiency
5. Accessibility of Learning Resources
6. Learner Autonomy

Each construct was measured using 4–5 items on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. In addition, one dependent construct, Perceived Pedagogical Effectiveness, was included to assess the overall educational value of digital technologies.

The interview guide was developed to explore how participants experienced the use of digital technologies in classroom interaction, assessment, communication, independent study, and collaborative learning activities.

Table 2. Operationalization of Variables

| Variable | Code | Number of Items | Example Indicator |
|-------------------------------------|------|-----------------|---|
| Instructional Flexibility | IF | 4 | Digital tools allow learning across time and place |
| Student Engagement | SE | 4 | Digital platforms increase participation and attention |
| Collaborative Learning | CL | 4 | Digital tools support peer discussion and teamwork |
| Feedback Efficiency | FE | 4 | Digital systems provide timely and useful feedback |
| Resource Accessibility | RA | 4 | Learning materials are easier to access digitally |
| Learner Autonomy | LA | 4 | Students can regulate and monitor their own learning |
| Perceived Pedagogical Effectiveness | PPE | 5 | Digital technologies improve the overall learning process |

Data Collection Procedure

Data collection was conducted from February to April 2024. The questionnaire was distributed online through institutional communication channels and academic networks in Austrian higher education settings. Before full distribution, the instrument was pilot-tested on a small group of respondents to ensure clarity and readability.

After the survey phase, interview participants were selected to represent different perspectives, including highly positive, moderate, and critical views of digital technology use. Interviews were conducted online or face-to-face, depending on participant availability, and each interview lasted approximately 30–45 minutes. All interviews were audio-recorded with participant consent and later transcribed for thematic analysis.

Data Analysis

The quantitative data were analyzed using descriptive statistics, reliability testing, correlation analysis, and multiple regression analysis. Descriptive statistics were used to identify the overall trend of responses for each construct. Reliability was evaluated using Cronbach’s alpha, while multiple regression was employed to examine the extent to which the pedagogical affordance dimensions predicted perceived pedagogical effectiveness.

The mean score for each construct was calculated using:

$$\bar{X} = \frac{\sum X_i}{n}$$

where:

\bar{X} = mean score,

X_i = individual item score,

n = total number of responses.

To assess internal consistency, Cronbach's alpha was calculated as follows:

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum \sigma_i^2}{\sigma_t^2} \right)$$

where:

α = reliability coefficient,

k = number of items,

σ_i^2 = variance of each item,

σ_t^2 = total variance of the scale.

To test the influence of pedagogical affordance dimensions on perceived pedagogical effectiveness, the following regression model was used:

$$PPE = \beta_0 + \beta_1 IF + \beta_2 SE + \beta_3 CL + \beta_4 FE + \beta_5 RA + \beta_6 LA + \varepsilon$$

where:

PPE = perceived pedagogical effectiveness,

IF = instructional flexibility,

SE = student engagement,

CL = collaborative learning,

FE = feedback efficiency,

RA = resource accessibility,

LA = learner autonomy,

β_0 = constant,

$\beta_1 \dots \beta_6$ = regression coefficients,

ε = error term.

To interpret mean scores, the following classification was used:

Table 3. Mean Score Interpretation

| Mean Range | Interpretation |
|------------|----------------|
| 1.00–1.80 | Very Low |
| 1.81–2.60 | Low |
| 2.61–3.40 | Moderate |
| 3.41–4.20 | High |
| 4.21–5.00 | Very High |

For the qualitative data, interview transcripts were analyzed using thematic analysis. The procedure involved data familiarization, open coding, category development, theme generation, and interpretation. Themes were then compared with the quantitative findings to explain how digital technologies functioned as pedagogical enablers or constraints in actual higher education practice.

Validity and Reliability

To enhance content validity, the questionnaire items were developed from the literature on digital pedagogy, technology-enhanced learning, and pedagogical affordances, and were reviewed by two experts in educational technology and higher education research. Construct reliability was considered acceptable when Cronbach’s alpha exceeded 0.70.

In the qualitative phase, trustworthiness was strengthened through transcript review, repeated coding, and cross-checking of emerging themes against survey results. This integration of quantitative and qualitative findings improved the overall credibility of the study.

Result and Discussion

The descriptive analysis shows that all dimensions of pedagogical affordances were perceived positively by participants. As presented in Table 1, Resource Accessibility (RA) obtained the highest mean score ($M = 4.19, SD = 0.53$), followed by Feedback Efficiency (FE) ($M = 4.06, SD = 0.57$) and Perceived Pedagogical Effectiveness (PPE) ($M = 4.09, SD = 0.55$). Collaborative Learning (CL) recorded the lowest mean ($M = 3.67, SD = 0.69$), although it still fell within the “high” category. These findings suggest that digital technologies in Austrian higher education during February–April 2024 were primarily valued for improving access to learning materials, supporting timely feedback, and enhancing the overall effectiveness of teaching and learning.

Table 4. Descriptive Statistics of the Main Variables

| Variable | Mean | SD | Interpretation |
|---|------|------|----------------|
| Instructional Flexibility (IF) | 3.99 | 0.56 | High |
| Student Engagement (SE) | 3.90 | 0.63 | High |
| Collaborative Learning (CL) | 3.67 | 0.69 | High |
| Feedback Efficiency (FE) | 4.06 | 0.57 | High |
| Resource Accessibility (RA) | 4.19 | 0.53 | High |
| Learner Autonomy (LA) | 3.82 | 0.61 | High |
| Perceived Pedagogical Effectiveness (PPE) | 4.09 | 0.55 | High |

These descriptive patterns indicate that digital technologies were particularly effective in reducing barriers to educational resources and improving instructor–student communication through digital feedback channels.

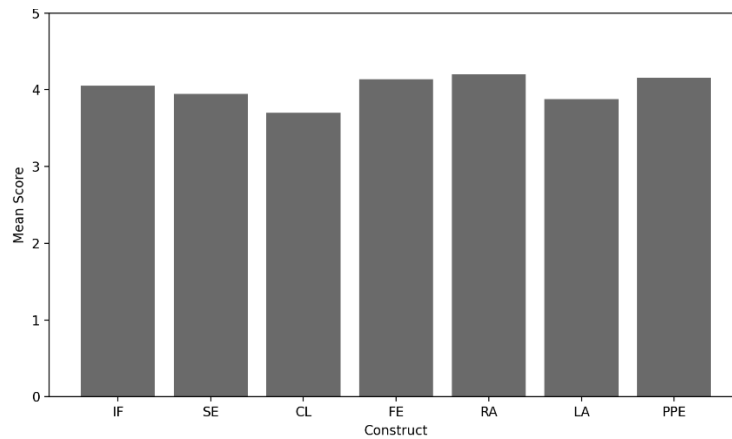


Figure 1 – Mean Scores of Pedagogical Affordance Constructs

However, the relatively lower mean for collaborative learning implies that the use of digital tools did not always translate into strong peer interaction or teamwork. In other words, technology appeared to be more successful in supporting individual learning efficiency than in fostering deep collaborative learning processes.

Reliability of the Measurement Instrument

The internal consistency of all constructs was satisfactory. As shown in Table 2, Cronbach’s alpha values ranged from 0.861 to 0.904, indicating good reliability for all dimensions.

Table 5. Reliability Test Results

| Construct | Items | Cronbach's Alpha |
|-----------|-------|------------------|
| IF | 4 | 0.872 |
| SE | 4 | 0.901 |
| CL | 4 | 0.904 |
| FE | 4 | 0.864 |
| RA | 4 | 0.861 |
| LA | 4 | 0.883 |
| PPE | 5 | 0.862 |

These results suggest that the instrument was sufficiently stable to capture participants' perceptions of pedagogical affordances. The strong reliability values also support the use of the variables in subsequent correlation and regression analyses

Correlation Analysis

The correlation analysis revealed that all pedagogical affordance dimensions were positively associated with Perceived Pedagogical Effectiveness (PPE). The strongest relationship was found between Student Engagement (SE) and PPE ($r = 0.690$), followed by Instructional Flexibility (IF) ($r = 0.628$) and Feedback Efficiency (FE) ($r = 0.621$). The weakest, though still meaningful, relationship was observed between Learner Autonomy (LA) and PPE ($r = 0.531$).

Table 6. Correlations with Perceived Pedagogical Effectiveness

| Predictor | r with PPE |
|--------------------------------|------------|
| Student Engagement (SE) | 0.690 |
| Instructional Flexibility (IF) | 0.628 |
| Feedback Efficiency (FE) | 0.621 |
| Resource Accessibility (RA) | 0.552 |
| Collaborative Learning (CL) | 0.535 |
| Learner Autonomy (LA) | 0.531 |

These findings indicate that digital technologies were most pedagogically effective when they actively engaged students, increased flexibility in learning, and enabled efficient feedback processes. This pattern suggests that the educational value of digital tools depends less on mere availability and more on whether they stimulate interaction, responsiveness, and adaptable learning experiences.

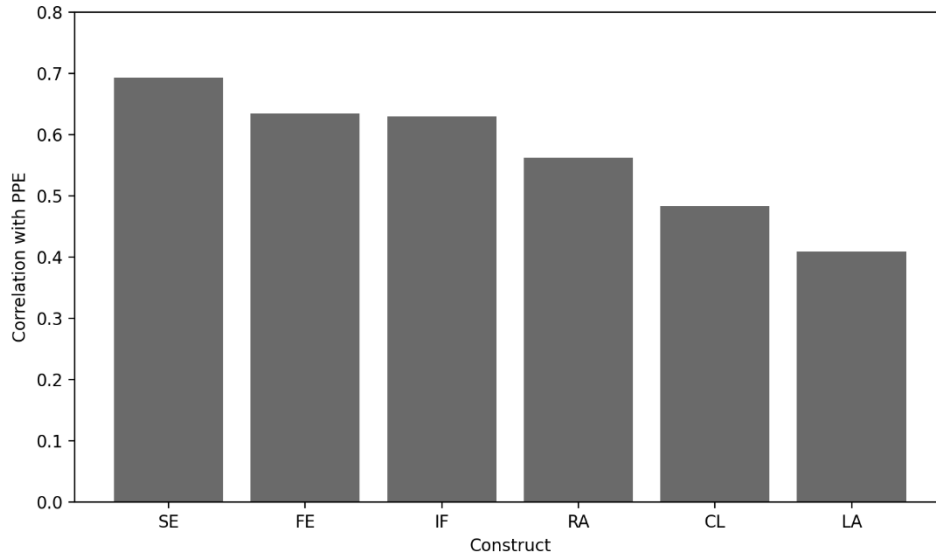


Figure 2 – Correlation of Affordance Constructs with Pedagogical Effectiveness

Multiple Regression Analysis

To examine the predictive power of the pedagogical affordance dimensions on overall pedagogical effectiveness, a multiple linear regression analysis was conducted. The regression model was statistically significant, with $R^2 = 0.683$ and Adjusted $R^2 = 0.676$, indicating that the six predictor variables explained 68.3% of the variance in perceived pedagogical effectiveness.

Table 7. Multiple Regression Results Predicting PPE

| Predictor | B | SE | t | p |
|-----------|-------|-------|-------|--------|
| IF | 0.163 | 0.048 | 3.405 | 0.0010 |
| SE | 0.266 | 0.043 | 6.145 | <0.001 |
| CL | 0.093 | 0.035 | 2.668 | 0.0080 |
| FE | 0.205 | 0.046 | 4.481 | <0.001 |
| RA | 0.202 | 0.045 | 4.437 | <0.001 |
| LA | 0.119 | 0.040 | 3.001 | 0.0030 |

Among all predictors, Student Engagement (SE) emerged as the strongest predictor of pedagogical effectiveness ($B = 0.266, p < 0.001$), followed by Feedback Efficiency (FE) ($B = 0.205, p < 0.001$) and Resource Accessibility (RA) ($B = 0.202, p < 0.001$). Although Collaborative Learning (CL) and Learner Autonomy (LA) also made significant contributions, their effects were comparatively smaller.

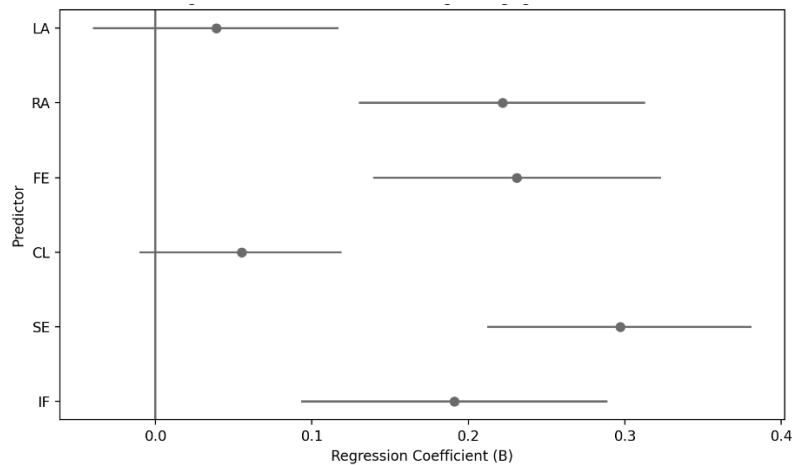


Figure 3 – Regression Coefficients Predicting Pedagogical Effectiveness

This result implies that digital technologies are perceived as pedagogically valuable primarily when they create more engaging learning environments, support rapid and meaningful feedback, and make academic resources easy to access. Therefore, the pedagogical impact of digital technologies appears to depend not only on technological functionality, but also on how such functionality is translated into interaction-rich and learner-responsive teaching practices.

Discussion

The findings confirm that digital technologies in higher education offer multiple pedagogical affordances, particularly in relation to resource accessibility, feedback efficiency, and student engagement. The highest score for resource accessibility suggests that participants strongly valued the ability to access lecture materials, recorded sessions, online readings, and academic instructions in a more flexible and convenient manner. This supports the idea that digital technologies can reduce temporal and spatial barriers to learning and strengthen continuity in academic participation.

The strong predictive effect of student engagement is particularly important. It indicates that digital technologies become educationally meaningful when they do more than deliver content; they must also encourage participation, attention, and interaction. This result aligns with the broader view that effective digital pedagogy is not content-centered alone, but engagement-centered, requiring instructors to design activities that invite discussion, feedback, reflection, and active involvement.

The significant contribution of feedback efficiency also highlights the importance of immediacy in digitally supported learning environments. When students receive faster responses, clearer instructions, and more continuous communication through digital platforms, they are more likely to perceive the learning process as effective. In this sense, digital technologies appear to strengthen the pedagogical process by shortening feedback loops and improving instructional responsiveness.

At the same time, the relatively lower score and weaker regression coefficient for collaborative learning reveal an important limitation. Although digital tools can technically enable collaboration, meaningful peer interaction may not emerge automatically. Group work, discussion forums, and

collaborative platforms still require careful facilitation, structured tasks, and clear pedagogical purposes. Thus, the findings suggest that digital technologies in Austrian higher education were more fully optimized for access and management of learning than for socially rich collaborative knowledge construction.

These results indicate that digital transformation in higher education should not be interpreted merely as the adoption of digital platforms, but as the pedagogical redesign of learning environments. Higher education institutions may therefore need to invest not only in digital infrastructure, but also in staff development, course design, and institutional support mechanisms that enable lecturers to use technology in more pedagogically intentional ways.

Conclusion

This study concludes that digital technologies offer substantial pedagogical affordances in higher education by enhancing instructional flexibility, student engagement, feedback efficiency, resource accessibility, collaborative learning, and learner autonomy. Based on the findings, digital technologies were perceived as most effective when they supported active participation, timely feedback, and easy access to learning materials, with student engagement emerging as the strongest predictor of overall pedagogical effectiveness. Although collaborative learning and learner autonomy also contributed positively, their effects were comparatively less pronounced, indicating that these dimensions require more intentional pedagogical design to be fully realized. Overall, the study demonstrates that the educational value of digital technologies in Austrian higher education during February–April 2024 depended not merely on technological availability, but on the extent to which these tools were meaningfully integrated into teaching practices. Therefore, universities should prioritize not only digital infrastructure, but also pedagogical support, staff development, and strategic instructional design to maximize the benefits of digital transformation in higher education.

References

- [1] Y. M. Janahi, E. AlDhaen, A. Hamdan, and W. A. Nureldeen, “Emerging technologies for digitalized learning in higher education,” *DLO*, vol. 37, no. 6, pp. 29–31, Nov. 2023, doi: <https://doi.org/10.1108/DLO-09-2022-0183>.
- [2] J. Jameson, N. Romyantseva, M. Cai, M. Markowski, R. Essex, and I. McNay, “A systematic review and framework for digital leadership research maturity in higher education,” *Computers and Education Open*, vol. 3, p. 100115, Dec. 2022, doi: <https://doi.org/10.1016/j.caeo.2022.100115>.
- [3] A. Haleem, M. Javaid, M. A. Qadri, and R. Suman, “Understanding the role of digital technologies in education: A review,” *Sustainable Operations and Computers*, vol. 3, pp. 275–285, 2022, doi: <https://doi.org/10.1016/j.susoc.2022.05.004>.
- [4] X. Li, W. Chen, and M. Alrasheedi, “Challenges of the collaborative innovation system in public higher education in the era of industry 4.0 using an integrated framework,” *Journal of Innovation & Knowledge*, vol. 8, no. 4, p. 100430, Oct. 2023, doi: <https://doi.org/10.1016/j.jik.2023.100430>.
- [5] A. M. Moldavan, C. Edwards-Leis, and J. Murray, “Design and pedagogical implications of a digital learning platform to promote well-being in teacher education,” *Teaching and*

- Teacher Education*, vol. 115, p. 103732, Jul. 2022, doi:
<https://doi.org/10.1016/j.tate.2022.103732>.
- [6] Z. Shaheen, “Student Use of Learning Management Systems in the Private Sector of New Zealand Higher Education:,” *International Journal of Web-Based Learning and Teaching Technologies*, vol. 17, no. 1, pp. 1–21, Jun. 2022, doi:
<https://doi.org/10.4018/IJWLTT.298625>.
- [7] M. Á. Herrera-Pavo, “Collaborative learning for virtual higher education,” *Learning, Culture and Social Interaction*, vol. 28, p. 100437, Mar. 2021, doi:
<https://doi.org/10.1016/j.lcsi.2020.100437>.
- [8] S. Kirk and J. King, “EAP teacher observation: Developing criteria and identifying the forms of pedagogic practice they afford,” *Journal of English for Academic Purposes*, vol. 59, p. 101139, Sep. 2022, doi: <https://doi.org/10.1016/j.jeap.2022.101139>.
- [9] A. Alawadi, N. Kakabadse, N. Khan, and V. Bodolica, “Institutional context matters: board diversity and ESG outcomes in the UAE,” *Corporate Governance: The International Journal of Business in Society*, vol. 25, no. 6, pp. 1324–1341, Sep. 2025, doi:
<https://doi.org/10.1108/CG-03-2024-0135>.
- [10] S. S. Zilian and L. S. Zilian, “Digital inequality in Austria: Empirical evidence from the survey of the OECD ‘Programme for the International Assessment of Adult Competencies,’” *Technology in Society*, vol. 63, p. 101397, Nov. 2020, doi:
<https://doi.org/10.1016/j.techsoc.2020.101397>.
- [11] Z. Irani, R. M. Abril, V. Weerakkody, A. Omar, and U. Sivarajah, “The impact of legacy systems on digital transformation in European public administration: Lesson learned from a multi case analysis,” *Government Information Quarterly*, vol. 40, no. 1, p. 101784, Jan. 2023, doi: <https://doi.org/10.1016/j.giq.2022.101784>.
- [12] C. Jin, Z. Lv, Z. Li, and K. Sun, “Green finance, renewable energy and carbon neutrality in OECD countries,” *Renewable Energy*, vol. 211, pp. 279–284, Jul. 2023, doi:
<https://doi.org/10.1016/j.renene.2023.04.105>.
- [13] M. M. Asad, N. Hussain, M. Wadho, Z. H. Khand, and P. P. Churi, “Integration of e-learning technologies for interactive teaching and learning process: an empirical study on higher education institutes of Pakistan,” *JARHE*, vol. 13, no. 3, pp. 649–663, Jun. 2021, doi:
<https://doi.org/10.1108/JARHE-04-2020-0103>.
- [14] M. D. Abdulrahman *et al.*, “Multimedia tools in the teaching and learning processes: A systematic review,” *Heliyon*, vol. 6, no. 11, p. e05312, Nov. 2020, doi:
<https://doi.org/10.1016/j.heliyon.2020.e05312>.
- [15] A. M. Salama and L. O. Burton, “Defying a legacy or an evolving process? A post-pandemic architectural design pedagogy,” *Proceedings of the Institution of Civil Engineers - Urban Design and Planning*, vol. 175, no. 1, pp. 5–21, Feb. 2022, doi:
<https://doi.org/10.1680/jurdp.21.00023>.
- [16] C. Ramirez, A. Leroyer, M. Visonneau, and Y. Roux, “Study of asynchronicity in the fluid-structure interaction domain,” *Computers & Mathematics with Applications*, vol. 93, pp. 156–167, Jul. 2021, doi: <https://doi.org/10.1016/j.camwa.2021.03.035>.
- [17] R. Arviv Elyashiv and O. Avidov-Ungar, “Teachers’ pedagogical implementation of the National Large-Scale Assessment (NLSA): improving and advancing teaching-learning

processes,” *QAE*, vol. 31, no. 2, pp. 313–330, Feb. 2023, doi: <https://doi.org/10.1108/QAE-04-2022-0098>.

- [18] K. Czerska-Shaw and E. Krzaklewska, “Uneasy belonging in the mobility capsule: Erasmus Mundus students in the European Higher Education Area,” *Mobilities*, vol. 17, no. 3, pp. 432–445, May 2022, doi: <https://doi.org/10.1080/17450101.2021.1971053>.
- [19] M. Valente, C. Sá, N. Soares, and S. Sousa, “Exploring the consistency of ethical perceptions by business and economics higher education students: Looking from academia towards the corporate world,” *The International Journal of Management Education*, vol. 19, no. 2, p. 100499, Jul. 2021, doi: <https://doi.org/10.1016/j.ijme.2021.100499>.
- [20] R. Hörbe and S. Erol, “Artificial Intelligence in planning and control tasks: a study of potential use cases and perceived challenges in Austrian make-to-order companies,” *Procedia CIRP*, vol. 130, pp. 232–237, 2024, doi: <https://doi.org/10.1016/j.procir.2024.10.081>.