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Collaboration, Creativity and Compassion in a Digital Society

Mobile learning in higher education post Covid: Emerging themes

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This concise paper reports on the emerging themes from an in progress systematic review of the literature on mobile learning studies in higher education 2020-2025. The review protocol was designed to explore whether mobile learning implemented in response to and subsequent to Covid restrictions has reinvigorated the impact of mobile learning or simply reinvented mobile learning for a new generation of practitioners and learners. While the literature evidences a large increase in mobile learning studies since 2020 there is little evidence of enabling new pedagogies or learner agency. Rather there appears to be a revisiting of the first phases of mobile learning circa 2000 that focus upon mobile devices to deliver content. From an initial 3,416 studies found based upon an a priori search protocol between 2020 to 2025 the review identifies 61 studies exploring new pedagogies via mobile learning in higher education. The review uses Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) reporting and the paper discusses emergent initial thematic analysis.

Keywords: Mobile Learning, new pedagogies, learner agency, higher education

Background

Mobile learning refers to any technology-enabled learning intervention delivered through mobile devices or mobile-capable platforms. This includes mobile applications, smartphones and tablets, mobile-enabled learning management system (LMS) features, mobile augmented or virtual reality (AR/VR), and mobile-supported hybrid or online learning environments. In this study, mobile learning is understood as interventions that explicitly support learning processes such as engagement, autonomy, and self-regulation.

The rapid expansion of mobile learning in higher education since the Covid-19 pandemic has reshaped expectations for flexible, student-centred learning environments. The pandemic triggered an unprecedented shift from traditional classroom teaching to online and blended delivery, with synchronous webinars and asynchronous self-paced learning becoming core components of higher education. Six years on, mobile-enabled online learning remains a preferred option for many students, even after the reintroduction of face-to-face teaching. This sustained reliance on flexible delivery has created new pedagogical challenges, particularly around student engagement, attendance in synchronous sessions, and maintaining meaningful human interaction in increasingly mobile and asynchronous learning environments. As Pei et al. (2024) argue, blended and flexible learning can weaken the sense of community and increase social isolation, reducing opportunities for collaborative learning.

Against this backdrop, the systematic review aims to explore emerging pedagogical approaches associated with mobile learning in higher education since 2020, identifying gaps in current research and implications for teaching practice. The central research question, "*To what extent emerging mobile learning environments enable new pedagogical approaches compared with traditional learning settings*?" reflects a growing need to understand how mobile learning can strengthen learner agency while preserving meaningful student–facilitator interaction. The literature consistently highlights mobile learning as a key driver of flexibility, accessibility, and learner autonomy. Lazaro and Duart's (2023) systematic review demonstrates that mobile learning has shifted from a supplementary resource to a core component of flexible learning in the post-pandemic era. Similarly, Qazi et al. (2024) emphasise that mobile learning became essential during Covid-19 due to its ability to support continuity of learning, and it remains central to post-pandemic higher education due to its accessibility and adaptability.

Cochrane et al. (2022) argue that mobile learning enables progression along the pedagogy–andragogy–heutagogy (PAH) continuum, supporting learner agency and self-determined learning. This continuum conceptualises learning as a developmental trajectory from teacher-directed instruction (pedagogy) to self-directed learning (andragogy) and ultimately to self-determined learning (heutagogy), where learners exercise high levels of autonomy and epistemic agency (Blaschke, 2019; Hase & Kenyon, 2000). Mobile learning theoretically affords this progression by enabling students to manage their own learning, access content flexibly, and engage in authentic, context-rich activities. However, despite its theoretical potential, mobile learning remains underutilised in supporting self-regulated learning and learner agency. Several authors highlight a persistent gap between the capabilities of mobile learning and its actual pedagogical implementation (Cochrane et al., 2022; Traxler, 2021). Much of the existing research focuses on mobile learning as a delivery mechanism rather than as a catalyst for pedagogical transformation. Studies often describe mobile learning as a technological response to pandemic-related disruptions, with limited attention to how mobile environments can enable new forms of authentic, student-generated, or self-determined learning. Kearney et al. (2012) further caution that the authenticity of mobile learning is frequently constrained by misalignment between mobile affordances and pedagogical design. The systematic review explores mobile learning development post Covid.

Methodology

This study draws on a systematic review designed to examine how mobile learning initiatives introduced during and after the Covid-19 pandemic have shaped learner agency in higher education. The review was conducted in accordance with PRISMA 2020 and recent Cochrane guidance, with an emphasis on transparency, reproducibility, and methodological rigour. A detailed protocol—covering search strategies, screening procedures, data extraction, and quality appraisal—has been registered on the Open Science Framework (OSF) and is available for consultation (Cochrane et al., 2025). The present paper provides a narrative overview of the approach, with full technical specifications reserved for the forthcoming comprehensive review.

The review focused on empirical studies published between 2020 and 2025, reflecting the rapid digital transformation in higher education during the pandemic period. Eligible studies examined undergraduate or postgraduate learners and explored mobile learning interventions that supported engagement, autonomy, self-regulation, or related dimensions of learner agency. These interventions ranged from mobile applications and mobile-enabled LMS features to mobile AR/VR experiences and hybrid or online learning environments accessed via mobile devices. Studies centred solely on technology acceptance were excluded, as were non-empirical publications.

To identify relevant literature, searches were conducted across major education and technology databases, including Scopus, Web of Science, ERIC, and EBSCO, supplemented by targeted searches of Google Scholar and grey literature sources such as university repositories and conference proceedings (e.g., ASCILITE, EDUCAUSE, mLearn). Two reviewers independently screened titles, abstracts, and full texts, resolving discrepancies through discussion or third-reviewer input. Data were extracted using a structured template aligned with the protocol, capturing study characteristics, theoretical framing, intervention design, agency-related outcomes, and contextual factors influencing learner experience. A PRISMA flow diagram documents the selection process in the final report and is summarised in Table1.

Table 1.
PRISMA diagram summary

Total imported	**Total screened**	**Total excluded**	**Total eligible studies**	**Total included**
3416	2131	536	597	61
Out 3,416, there were 50 duplicates identified manually and	Out of 2,131, 1,511 studies were deemed irrelevant	Reasons for exclusion: • Not mobile learning – 164 • Data pre-Covid (before 2020) – 117 • No new pedagogical development – 81		

1,233 duplicates identified by Covidence		• Methodological misalignment (not a research report, wrong intervention, unclear methodology, wrong outcomes, study design and setting) – 41 • Not higher education focused – 37 • Technology acceptance model (TAM) – 27 • Content delivery – 21		

Quality appraisal was undertaken using established tools appropriate to study design, ensuring that the synthesis reflected both the strength and limitations of the evidence base. The analysis adopted a narrative approach, organising findings around types of mobile learning interventions, dimensions of learner agency, and the pedagogical or institutional contexts in which these interventions were implemented. Qualitative insights were interpreted thematically, and an equity lens was applied throughout to consider how mobile learning may support or constrain diverse learners. Meta-analysis was conducted only where outcome measures were sufficiently comparable. As this study involved a systematic review of previously published research and did not include human participants or identifiable data, formal ethics approval was not required.

Summary of findings

The dataset contains higher-education studies published from 2020 to 2025 examining mobile learning, AR, (VR), mixed reality (MR), mobile apps, and AI-supported learning. Studies span from North America, Europe, Asia, Africa, Australia, and the Middle East, with participants primarily drawn from undergraduate students, alongside smaller samples of pre-service teachers, faculty, and industry partners. Study designs include quasi-experimental, experimental, mixed-methods, qualitative case studies, and randomised controlled trials.

Technologies and pedagogical approaches

Mobile and immersive technologies are diverse, including VR headsets, AR mobile apps, mobile language-learning apps, gamified mobile tools, 360° video, HoloLens MR, and AI-enhanced mobile learning. Pedagogical foundations commonly reference constructivism, experiential learning, situated cognition, self-determination theory, and the PAH continuum. A minority of studies explicitly use activity theory or critical pedagogy. Most interventions remain teacher-designed and teacher-directed, with limited movement toward fully self-determined learning.

Learner agency and engagement

Learning outcomes are mixed. Approximately half of the included studies report measurable improvements in areas such as language acquisition, spatial understanding, anatomy learning, critical thinking, systems thinking, and creativity. Several VR and AR studies show no significant difference compared to traditional methods, despite higher engagement. Negative or neutral outcomes often relate to cognitive load, technical complexity, or misalignment between game mechanics and academic content.

Barriers, contradictions and equity

Common barriers include motion sickness, hardware unfamiliarity, digital literacy gaps, technical instability, and infrastructure limitations. Activity theory analysis reveals recurring contradictions across tools, subject, community, rules, and division of labour, particularly around rigid curricula, unclear policies, and teacher-dominated roles. Equity considerations such as device access, cost, and digital readiness appear across studies but are rarely systematically measured.

Design for Transformative learning (DTML) and transformative learning indicators

DTML scoring (Cochrane et al., 2022) across studies on a scale of 1-3 suggests most interventions sit at Level 1–2, indicating augmentation of prior pedagogical practice rather than transformation. Few studies reach Level 3 in areas such as epistemic cognition, student-controlled learning, creativity, knowledge production, or

ontological shifts. Transformative learning is most evident in co-design projects, student-generated mobile content, and authentic outdoor mobile learning.

Summary of emerging themes

Across the reviewed studies, four interconnected themes illustrate how mobile learning in higher education has evolved in the post-Covid landscape. First, mobile learning environments strongly support learner agency and self-determination, with students exercising meaningful control over when, where, and how they learn. Second, mobile learning increasingly positions students as producers of knowledge, not just consumers. Third, mobile learning facilitates authentic and context-shaping experiences, enabling students to engage with real-world environments beyond the classroom. Finally, mobile learning supports identity formation and becoming, helping students rebuild academic, professional, and personal identities disrupted during the pandemic. Collectively, the themes indicate a shift from emergency remote teaching toward agentic mobile learning, where mobile technologies act as tools for autonomy, creativity, authenticity, and identity formation across flexible digital and physical learning spaces. Emerging themes from the 61 included studies are summarised in Figure 1.

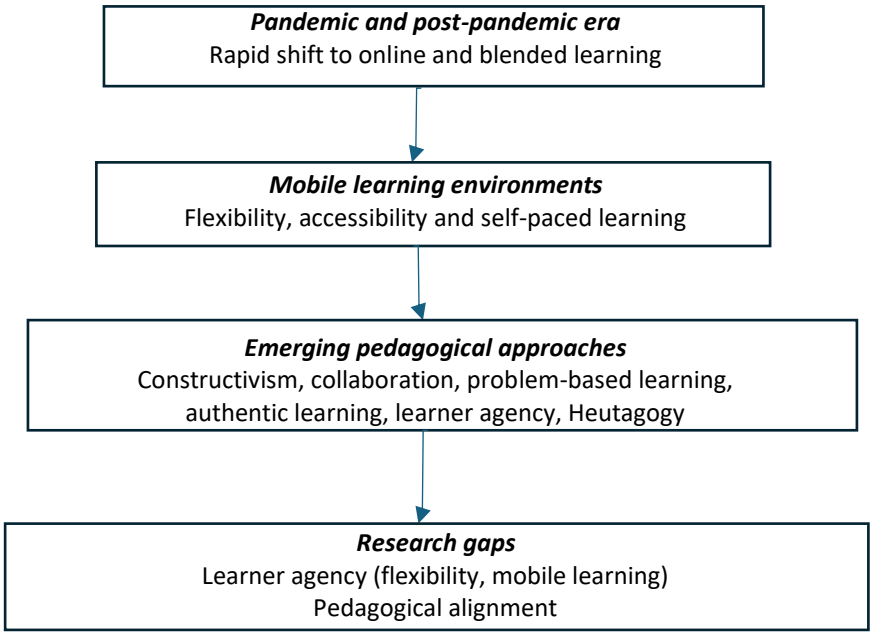


Figure 1. Emerging themes from the included mobile learning studies in the post-pandemic era: from online learning shift to the emergence of new pedagogies

Overall synthesis and conclusion

Across the dataset, mobile and immersive technologies appear widely adopted, engaging, and pedagogically promising, yet their implementation often remains constrained by teacher-directed design and technology-driven decisions. While many studies report gains in motivation, engagement, and authentic learning, learner agency emerges as the weakest and least consistently supported dimension. Opportunities for autonomy, co-creation, and self-determined learning are frequently limited by institutional structures, risk-averse practices, and a tendency to use mobile tools for delivery rather than transformation. Equity considerations also remain underexplored, despite their clear influence on the inclusivity and effectiveness of mobile learning.

Taken together, the 61 studies show that although mobile learning has become deeply embedded in higher education since 2020, its pedagogical potential particularly in strengthening learner agency remains underdeveloped. Advancing mobile learning now requires a shift from access and flexibility toward designs that foster meaningful interaction, collaboration, and student control within blended and mobile-first

ecosystems. These insights highlight the need for future research and practice to more deliberately integrate agency-enhancing pedagogies, a direction that will be expanded in the forthcoming full systematic review.

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