

Article type

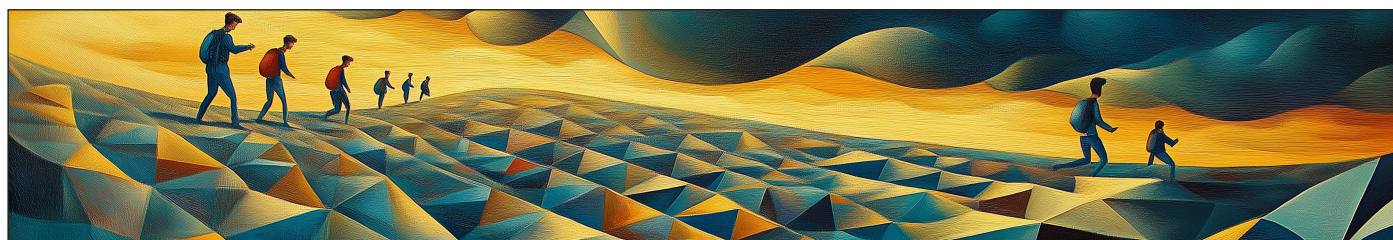
Full paper, double-blind peer review.

Publication history

Received: 12 September 2024. Revised: 23 December 2024.
Accepted: 07 January 2025. Online: 24 March 2024.

Cover image

Badly Disguised Bligh via flickr.



Special issue Activity theory in technology enhanced learning research (part 2) | **More at** <https://doi.org/10.21428/8c225f6e.a88579e2>

Contradictions and strategies: an evaluative case study of digital technology use in a UK land-based educational institution through the lens of Cultural Historical Activity Theory

Nico D. Smit^{1, 2}

¹ Business and Digital Skills, Capel Manor College, London, United Kingdom

² Department of Educational Research, Lancaster University, Lancaster, United Kingdom

Keywords

contradictions and strategies;
evaluative case study; digital
technology use; UK land-based
educational institutions; CHAT

Citation

Smit, N. D. (in press). Contradictions and strategies: an evaluative case study of digital technology use in a UK land-based educational institution through the lens of Cultural Historical Activity Theory.

Studies in Technology Enhanced Learning, 4(1), 1-49.

<https://doi.org/10.21428/8c225f6e.5187245c>

Abstract

Integrating digital technologies profoundly shapes educational practices and institutional operations, reflecting broader societal shifts toward digitalisation. However, research is still developing on the use of digital technologies by faculty members in educational institutions, particularly in UK land-based educational settings. Challenges remain in understanding the full scope of the effects of digital technologies and to identify gaps in existing research. This study aims to analyse the connections between faculty members, technological tools, institutional policies, and the broader educational community. Data were collected using semi-structured interviews. Thematic analysis was used to identify recurring patterns and contradictions in the data. Institutional policy documents were used to analyse documents, interview data, and provide background data. The findings revealed key challenges, such as mismatched digital tools, lack of teacher support, and conflicting institutional policies. These findings underscore the potential of resolving systemic contradictions to enhance technology-enhanced learning practices by fostering smoother technology adoption among faculty members, improving student engagement, and creating more inclusive online learning environments. This study contributes to the existing literature by shedding light on these contradictions and proposing strategies to address them, thereby enhancing the integration of digital technology in education.

1. Introduction

Rapid technological advancements have led to the increased use of digital technology in education. Digital technology has numerous benefits as a teaching tool with results, such as improved students' language, communication, reasoning and innovation (Haleem et al., 2022; Parveen & Ramzan, 2024). This research study addresses the lack of adequate digital strategy implementation at a land-based college in the United Kingdom (UK). Previous research literature has highlighted that while digital alignment with educational goals is crucial, several factors must be considered when implementing these strategies (Kundu et al., 2020; Önalán & Kurt, 2020; Maheshwari, 2021). This study situates these systemic challenges within the technology-enhanced learning (TEL) framework, emphasising how addressing these contradictions can lead to improved pedagogical outcomes, greater engagement, and streamlined technology integration.

Addressing contradictions in digital technology use is not unique to the educational sector. Industries such as health-care and finance have implemented strategies to overcome similar challenges, offering valuable lessons for educational institutions. For instance, the financial services sector has recognised that rapid technology adoption can introduce systemic risks, prompting the development of comprehensive risk management frameworks to mitigate these issues (Financial services study reveals emerging tech-driven systemic risks, 2021). Drawing on these cross-sectoral experiences, this study situates its findings within a broader context, aiming to inform not only land-based education but also other fields facing similar systemic tensions.

This study uses Cultural Historical Activity Theory (CHAT) to understand how people, tools, and systems interact in educational contexts. CHAT highlights the tensions, or 'contradictions,' that arise when parts of a system—such as *tools*, *rules*, and *objects*—fail to align. These contradictions are not just obstacles but opportunities to innovate and improve practices. By analysing these challenges, CHAT provides a framework to address systemic barriers and enhance the integration of digital tools in teaching.

TEL frameworks emphasise the alignment of digital tools with pedagogical practices to enhance student outcomes and faculty engagement (Kirkwood & Price, 2014; Passey, 2019). CHAT's systemic perspective complements TEL by identifying contradictions hindering such frameworks' integration and providing actionable insights for resolving these barriers

(Bligh & Flood, 2017). This study builds on these synergies, exploring how CHAT can inform TEL practices in UK land-based education.

According to Capel Manor College's (Capel) Digital Strategy Policy (2020-2021), the main aim of implementing digital strategies in the institution is to provide an excellent and consistent digital experience for staff members, students, partners and customers. This study aimed to examine and critique how the Capel Digital Strategy Policy is implemented from the perspective of social practice, providing insights to inform and refine these strategies for better alignment and effectiveness.

Research on these issues emphasises various approaches to digital strategy implementation. The arguments in the literature are that effective digital technology integration requires comprehensive strategies aligned with educational goals (Bond et al., 2018; Ovcharuk et al., 2020), although there are disagreements about the best methods to achieve this (Limani et al., 2019; Webster & Gardner, 2019). Some shortcomings in the current literature include a lack of focus on the specific challenges faced by land-based educational institutions and the need for strategies that address these unique contexts.

This paper investigates digital strategy implementation at Capel, a UK land-based institution, using CHAT as its theoretical framework. The research was conducted over four months and involved document analysis and semi-structured interviews with faculty members across five campuses from eleven land-based occupational areas. The findings reveal critical contradictions in the use of digital technology and provide recommendations to enhance digital strategy implementation. This study aims to address some of the shortcomings in the current literature by offering insights into the specific challenges and needs of land-based educational institutions.

As a UK land-based further education college business and digital skills lecturer, I find myself at an educational institution operating without a clearly communicated digital strategy and no direction for using suitable technology. This personal experience underscores the importance of this research, which aimed to understand the contradictions of how faculty members communicate, share resources, and face technology challenges.

This research has significant implications for policy development in the context of digital technology integration in education. It contributes to the body of literature and offers valuable inputs for policymakers and educators to develop

more effective frameworks for digital technology use in educational settings. This research was necessary, meaningful, and well-timed because it addressed the pressing need for effective digital technology integration in education.

1.1 Research questions

The following primary research question was formulated:

RQ 1. How are digital strategies at UK land-based educational institutions impacted by contradictions of faculty members' social practices?

Research sub-questions were formulated to channel the research study to the primary research question as it cannot be addressed in isolation, i.e.:

RQ 1.1. How does Cultural Historical Activity Theory illuminate contradictions in technology-use among faculty members at a UK land-based institutions?

RQ 1.2. How do existing digital strategies align or conflict with faculty members' technology practices and challenges?

RQ 1.3. What technology-related challenges do faculty members face, and how do these impact resource sharing and communication?

2. Literature review

This literature review aims to critically engage with academic knowledge relevant to digital technology use in United Kingdom (UK) land-based educational institutions through the use of Cultural Historical Activity Theory (CHAT). It explores two interrelated fields that inform the core argument of this paper: digital strategy in education, and technology adoption and challenges in further education/higher education. These fields were chosen for their relevance to this study's research design and key arguments for their potential to contribute to the understanding of effective digital strategy implementation.

The literature search began with a research of literature on these two interrelated fields using Lancaster University's OneSearch database, which consists of 380 diverse databases. Google Scholar grey literature was included to mitigate bias and enhance the overall literature review quality. Different Boolean search strings were used, concentrating on the two interrelated fields:

Digital strategy in education

("digital strategy" OR "digital transformation" OR "technology strategy") AND ("educational institutions" OR "higher education" OR "land-based education" OR "agricultural education") AND ("United Kingdom" OR UK) AND ("implementation" OR "challenges" OR "faculty engagement" OR "student outcomes" OR "teaching practices" OR "learning practices") AND ("case study" OR impact OR "best practices" OR "gap analysis" OR improvement)

Technology adoption and challenges in further education/higher education

("technology adoption" OR "technology use") AND ("higher education" OR "university" OR "college") AND ("faculty experiences" OR "MS TEAMS" OR "SharePoint" OR "Moodle" OR "institutional policies" OR "technology training") AND (barriers OR "outdated software" OR "lack of training" OR "unclear policies") AND ("communication practices" OR "resource-sharing" OR "faculty and student interactions") AND (challenges OR "successful strategies" OR "areas of difficulty")

Thousands of results were returned by Google Scholar when using the same search parameters. Initially, 76 references were considered. To refine the results, the abstracts were manually reviewed to exclude studies not directly relevant to the research focus, reducing the number to 48. A preliminary examination identified and eliminated duplicate sources and those lacking educational value, further narrowing the selection to 42 references. Finally, sources unrelated to the core areas were excluded. To improve the literature study's credibility and thoroughness and ensure data triangulation, a comprehensive search for cited references was conducted (Watson et al., 2014), resulting in 33 references and data saturation. Only references published in the past decade were included, except for significant contributions before 2014. The review was limited to English language, peer-reviewed references with full-text versions accessible online.

This review highlights the gap at the intersection of these two fields, positioning the current study amidst existing literature. Subsequent subsections explore each of the two interrelated fields, leading to the core argument that effective digital technology integration requires an understanding of the sociocultural context provided by CHAT.

2.1 Digital strategy in education

A digital strategy in education is often defined as a plan outlining how digital tools will be implemented to enhance teaching, learning and administrative processes (Correani et al., 2020). Falloon (2020) has identified the key components of digital strategies in educational settings, including:

- Technology,
- Digital literacy of students and educators, and
- Integration of digital tools into the curriculum.

2.1.1 Growing trends: Blended learning, learning management systems, and data analytics

One emerging theme from the literature is the growing trend of using blended learning, learning management systems, and data analytics to inform teaching practices. Graham (2018), Kumar et al. (2021), and Kilag et al. (2023) explored the adoption of blended learning models, which include integrating online and in-person instruction to provide more adaptable learning environments. Sharifov et al. (2021) suggested that a learning management system is a crucial communication and interaction tool with great value for students and educators in an online learning setting. Koh and Kan (2021) argued that to promote student-centred digital learning experiences, it is necessary to simultaneously address infrastructural enhancements and faculty members' training. Herodotou et al. (2020) suggested that the level of involvement of faculty members in data learning analytics, digital literacy, and their understanding of online education had an effect on the deployment of predictive learning analytics. While the literature highlights the growing trend of using these technologies to inform teaching practices, there seems to be a lack of concrete strategies to successfully implement these tools to address the cultural and organisational barriers that can hinder their adoption. This study builds upon these foundations to suggest effective strategies for implementing digital technologies in educational institutions.

2.1.2 Shaping educational practice: Digital strategy components

Another core theme that emerges in the literature is the significance of digital strategy components in shaping educational practices. Correani et al. (2020) contributed meaningfully to this topic by examining the strategic implementation of digital strategies, concluding that such strategies create immense value and effectiveness. In support of this, other

findings highlight that when effectively implemented, digital technologies can meaningfully improve student engagement and learning (Bond et al., 2018; Ovcharuk et al., 2020). However, Limani et al. (2019) and Webster and Gardner (2019) suggest that the efficacy of digital strategies is closely tied to institutional readiness. Other scholars emphasise that effective implementation of digital strategies in institutions is dependent on improved student outcomes, the need for educators to be trained in relevant technology, and the importance of strategic planning to maximise the benefits of technological advancements (Heo & Han, 2021; Ismail et al., 2021; Tsiakara, 2023). These findings are valuable in highlighting the cultural and organisational barriers to digital strategy implementation. This paper will build on these insights by recognising the interplay between digital strategies, faculty members' engagement, and student outcomes.

Technology-enhanced learning (TEL) frameworks provide valuable insights into addressing the barriers identified in digital strategy implementation. Frameworks like the Teacher Digital Competency Framework (Falloon, 2020) emphasise the need for faculty digital literacy to achieve effective technology integration. CHAT complements this perspective by providing a lens to examine and resolve systemic barriers within TEL practices, such as misaligned institutional policies or inadequate support structures (Bligh & Flood, 2017). By addressing these challenges, TEL frameworks informed by CHAT can create a more inclusive and adaptive digital learning environment.

In the public sector, the adoption of digital platforms has transformed work practices, leading to both improvements and challenges. A study on implementing a digital platform called OneStop in the United States building departments revealed that while standardised processes, it also exacerbated inequitable practices due to reduced face-to-face interactions (Kim et al., 2024). These insights highlight the importance of designing digital strategies that consider user engagement and equity, lessons that are equally applicable to educational institutions seeking to integrate technology effectively.

2.2 Technology adoption and challenges in further education/higher education

Most studies on technological adoption in higher education find that implementing digital tools depends on several critical factors, including institutional leadership and support, adequate technological infrastructure, alignment with pedagogical objectives, continuous faculty members training and development, and institutional culture and

readiness for change (Chugh et al., 2023; Digital Education Outlook 2023, 2023; Timotheou et al., 2023). One examined field in the literature is the importance of institutional leadership and policy in driving successful technology use.

2.2.1 Technology adoption: Institutional policies and training

The theme of clear institutional policies and comprehensive training to ensure effective technology adoption is discussed in several papers. For instance, Leithwood et al. (1999) highlight the role of institutional leadership in driving technology use, while Kundu et al. (2020), Önalán and Kurt (2020) and Maheshwari (2021) emphasise the importance of contextual factors, such as institutional culture and available resources in determining the effectiveness of technology adoption. In addition, Oliveira et al. (2021) emphasise the role of institutional barriers, such as outdated software and insufficient training, hindering effective technology use. However, despite the emphasis on institutional factors, there is a noticeable gap in the research on how digital strategies are impacted by contradictions in faculty members' social practices at UK land-based educational institutions, which warrants further investigation.

2.2.2 Technology adoption and faculty members' engagement relations

Another theme that emerges from the literature is the relationship between technology adoption and faculty members' engagement. Issues of faculty members' engagement and institutional barriers have increasingly been examined that hinder the adoption of digital tools in these institutions (Buchanan et al., 2013; Calikoglu et al., 2022). Scholars seemingly disagree on whether faculty members' engagement and institutional barriers are critical factors in technology adoption. For example, Hafifah and Sulisty (2020) argue that educators' ICT literacy is crucial in implementing digital technology, while Krašna and Pesek (2020), Khomik et al. (2021) and Dezelak et al. (2022) emphasise the need for comprehensive training and clear institutional policies.

Digital literacy is a significant factor shaping faculty members' engagement with technology. Defined as the abilities and knowledge required to navigate a fragmented and complex information ecology (Eshet-Alkalai, 2004), digital literacy encompasses skills such as using digital tools effectively, engaging with digital resources, and adapting to emerging technological trends. Faculty members with higher levels of digital literacy are better equipped to integrate digital tools into their teaching practices, while those with lower proficiency may experience barriers to adoption. This

disparity highlights the importance of targeted training programmes and institutional policies aimed at improving digital literacy among educators.

Addressing the socio-cultural dynamics in these institutions is also likely to influence the effectiveness of these barriers and the strategies used to overcome them. The interplay between digital literacy, institutional support, and faculty members' engagement underscores the complex nature of technology adoption in educational contexts. Therefore, this research provides a more comprehensive understanding of the socio-cultural dynamics that shape these relationships, ultimately contributing to the successful implementation of digital strategies.

2.2.3 Student engagement and learning effectiveness

This field is represented by a focus on integrating technology into education. However, the themes of student engagement and learning effectiveness have increasingly been examined in the literature in recent years. Some studies have examined the impact of interactive technologies on student participation, concluding that these tools significantly enhance engagement and learning outcomes (Raes et al., 2020; El-Sabagh, 2021). In contrast, Backfisch et al. (2021) suggest that the efficacy of educational technology is highly dependent on the context of its implementation. In other settings, Blikstad-Balas et al. (2022) and Quezada-Morales (2022) illustrate the problematic aspects of unequal access to technology. Such narratives are valuable in highlighting the digital divide. The present paper builds on those insights by recognising the interplay between technology integration, student engagement, and learning strategies. It is recognised that such accounts routinely obscure how educator training and support mechanisms impact the successful implementation of educational technologies, which this paper sought to confront through a comprehensive review of existing training programmes (Scherer et al., 2019).

2.3 Conclusion

The above works of literature all have a common finding emphasising the importance of contextual factors, such as training, institutional policies and faculty members' engagement in successfully implementing technology use. Nonetheless, there is a notable gap in the research on the social practices surrounding technology use by faculty members. This gap points to the need for a more comprehensive understanding of the socio-cultural dynamics. Therefore, this paper seeks to contribute to the existing literature by answering the primary research question: *How are digital strategies at UK land-based educational institutions impacted*

by contradictions of faculty members' social practices? The study aimed to address the question by critically engaging with the academic knowledge relevant to digital technology use through the lens of CHAT. The literature review highlighted several themes, including the importance of digital strategies, faculty members' engagement, and institutional barriers in shaping the adoption and integration of digital technologies in higher education settings. However, the existing literature lacks a comprehensive understanding of how these factors interact and influence the implementation of digital strategies. Specifically, the literature overlooks the role of contradictions in faculty members' social practices in shaping digital strategies at UK land-based educational institutions. Schatzki (2001) defines social practices as the routine, shared activities and behaviours through which individuals interact with institutional norms, tools, and their sociocultural context. Addressing these practices allows for a deeper understanding of how faculty members' behaviours and contradictions influence the implementation of digital strategies.

3. Theoretical framework

This study employs Engeström's Cultural Historical Activity Theory (CHAT) (1987) as its theoretical framework to explore the dynamics of digital technology use by faculty members in United Kingdom (UK) land-based educational institutions. CHAT provides a comprehensive lens for examining the relationships between institutional strategies, teaching practices, and digital tools while identifying the contradictions that arise within these systems (Engeström, 1987; Engeström & Sannino, 2021). Central to CHAT are the concepts of action and operation, essential for understanding how individuals engage in social practices. Actions refer to goal-directed processes consciously undertaken by subjects, while operations are the automatic or habitual processes that support these actions (Vygotsky, 1978; Engeström, 1987). These concepts provide a foundational understanding of the systemic dynamics within educational practices and will be explored further throughout this section. CHAT's emphasis on the socio-cultural and systemic aspects of activity makes it particularly relevant for analysing the unique challenges and opportunities within these educational contexts (Roth et al., 2009). The analysis highlights the importance of action and operation, which deepen our understanding of individual engagement in social practices. Actions, defined as goal-oriented processes, and operations, as habitual or automated practices, form the backbone of activity systems by delineating conscious efforts from routine behaviours

(Vygotsky, 1978; Engeström, 1987). These concepts form a critical foundation for understanding the dynamics of digital technology use and the contradictions within these systems.

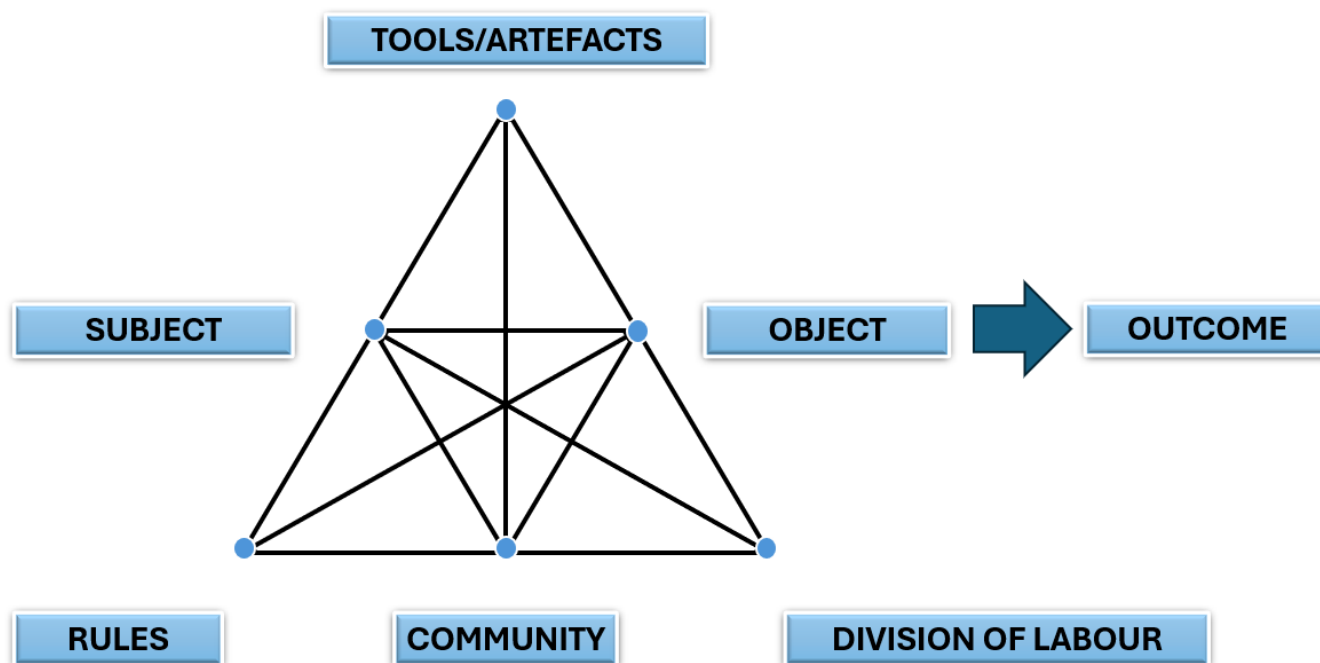
3.1 The foundations of CHAT

CHAT builds upon Lev Vygotsky's original Activity Theory, which introduced the concept of mediated action as a three-way interaction between *subject* (the student using the technology), *object* (the goal or task the subject aims to achieve using the technology), and *mediating tools* (the tools or technologies that facilitate subject-object interaction) (Vygotsky, 1978). These interactions can be further understood through the concepts of goal-directed actions and habitual operations. Actions represent conscious efforts to achieve specific objectives, while operations refer to the routine, often subconscious, methods that enable these actions (Vygotsky, 1978; Engeström, 1987). This distinction is crucial for setting up the importance of the activity system model in understanding how technology is integrated into educational practices. This interaction is referred to as the first generation of Activity Theory. Yrjö Engeström (1987) extended this foundational model into the activity system model, incorporating additional elements to provide a more holistic understanding of the socio-cultural environment in which activities take place.

Engeström's CHAT (1987) represents the second generation of Activity Theory, which focuses on analysing the tensions and contradictions that emerge within and between elements. This is illustrated graphically as an activity system, shown in Figure 1. The seven core elements of an activity system are:

- *Subject*: The individual or group engaged in the activity, such as faculty members adopting digital tools in their teaching practices.
- *Object*: The goal or motive driving the activity, such as improving teaching quality or fostering student engagement through digital technologies.
- *Tools*: The mediating artefacts (digital or physical) that facilitate interaction between the *subject* and *object*, including platforms like Moodle, Microsoft Teams, and traditional resources.
- *Rules*: The explicit and implicit norms, guidelines, and policies that shape the activity, such as institutional digital strategies.
- *Community*: The social group or environment in which the activity takes place, encompassing students, administrators, and policymakers.

Figure 1. Activity system used in CHAT (adapted from Engeström, 2001)



- *Division of labour*: The allocation of roles and responsibilities within the activity system, such as the roles of faculty members, information technology staff, and institutional leadership.
- *Outcome*: The intended or unintended results of the activity, such as enhanced learning outcomes or increased faculty members' digital literacy.

The concepts of action and operation play a critical role in understanding these elements. Actions are goal-directed processes consciously carried out by subjects to achieve their objectives, such as faculty members designing a new online course. Operations, by contrast, are the automatic or habitual processes that underpin these actions, such as using a familiar digital platform. To provide a clearer foundation for understanding CHAT, these key concepts are introduced earlier to help ground the framework in individual and collective engagement processes within activity systems. CHAT's inclusion of these elements allows for a systemic and contextualised analysis of educational practices, making it particularly suited to investigating the interplay between technology, pedagogy, and institutional structures in land-based education (Bligh & Flood, 2017). Differentiating between actions and operations helps identify where contradictions might arise—for example, when habitual operations conflict with new institutional rules or policies.

3.2 Contradictions in CHAT

In CHAT, contradictions refer to the tensions or conflicts that occur when different system elements, such as *tools*, *rules*, or *objects*, do not work well together. These contradictions often emerge from the interplay of actions and operations, where habitual processes may not align with the goal-directed actions required to adapt to new tools or policies (Bligh & Flood, 2017; Engeström & Sannino, 2021). For example, a teacher who prefers traditional methods may struggle when their institution requires them to use new digital tools, creating a conflict between their usual habits and new expectations. When addressed effectively, these challenges can lead to meaningful improvements (Engeström, 2008). Addressing these contradictions has profound implications for technology-enhanced learning (TEL). By resolving systemic tensions—such as misalignment between digital tools and educational goals—institutions can foster smoother technology integration, enhance student engagement, and promote innovation in digital learning practices. This connection underscores how CHAT provides a robust framework for driving improvements in TEL by identifying and addressing key systemic barriers (Kundu et al., 2020; Önalán & Kurt, 2020; Maheshwari, 2021).

Engeström (2008) categorises contradictions into four types:

- *Primary contradictions*: When problems, tensions or conflicts arise within elements of the activity system, this includes *subject*, *artefact*, *object*, *rules*, *community*, and *division of labour*, such as faculty members' conflicting perceptions of the usefulness of digital tools.
- *Secondary contradictions*: Tensions between elements of the same activity system, such as a misalignment between institutional policies (*rules*) and faculty members' practices (*subject*).
- *Tertiary contradictions*: Problems, tensions, or conflicts arise when participants in an activity system are confronted with a more advanced or alternative activity system that challenges the existing one. Such as introducing a new digital strategy that disrupts established practices.
- *Quaternary contradictions*: When tensions, problems or conflicts arise between the central activity system and neighbouring or interacting activity systems. Such as conflicts between faculty members and external stakeholders like policymakers.

Actions and operations are pivotal in understanding these contradictions. These contradictions are key to understanding how digital strategies are implemented and adapted. For instance, a secondary contradiction may arise when an action (e.g., designing a blended learning curriculum) requires operations (e.g., digital competencies) that the subject has not yet mastered. Identifying such gaps can inform targeted interventions to resolve these tensions.

3.3 Expansive learning

Expansive learning in CHAT is about solving problems by working together to improve a system's functions, leading to new ideas and innovations (Engeström, 2008). This concept integrates the interplay of actions and operations, which are fundamental in resolving systemic contradictions and fostering social practices. Actions, as goal-directed processes, and operations, as habitual or automatic practices, are crucial in facilitating the iterative cycles of expansive learning.

Faculty members encountering systemic tensions—such as misalignments between institutional policies and their pedagogical practices—engage in cycles of reflection, dialogue, and experimentation. These cycles often involve questioning existing practices, analysing systemic contradictions, and collaboratively developing solutions. For example, teachers might combine hands-on activities with digital

tools to overcome challenges in outdoor learning. These efforts resolve contradictions and drive institutional reforms, such as enhanced professional development and improved technological infrastructure (Sannino et al., 2016; Bligh & Flood, 2017).

Expansive learning builds upon the understanding that activity systems are not static but continuously evolve in response to emerging challenges. This dynamic process enables participants to redefine objectives, adapt practices, and innovate in socio-technical environments. For instance, expansive learning in land-based educational contexts has facilitated the redesign of curricula to align digital tools with outdoor learning objectives better. Faculty members have collectively fostered sustainable systemic change by addressing systemic barriers like inadequate infrastructure and limited digital competencies. Engeström (2008) and Yu (2023) highlight the transformative potential of such cycles, underscoring how contradictions act as catalysts for innovation and growth.

Expansive learning addresses systemic contradictions and drives improvements in TEL. By engaging in reflection, experimentation, and collaboration cycles, educators can innovate their practices to integrate digital tools more effectively (Engeström, 2008; Sannino et al., 2016). These cycles enable the redesign of curricula and teaching strategies to align better with TEL objectives, such as enhancing student engagement and fostering smoother technology adoption (Bligh & Flood, 2017; Backfisch et al., 2021). Furthermore, expansive learning supports the development of adaptive digital ecosystems, enabling institutions to use predictive tools and analytics to improve TEL practices continuously (Herodotou et al., 2020).

Through the lens of expansive learning, this study highlights the potential for systemic innovation in UK land-based educational institutions. Faculty members' collaboration and reflective practices address immediate challenges and contribute to developing inclusive and effective digital ecosystems. By integrating actions and operations into this analysis, expansive learning provides a comprehensive framework for aligning institutional goals with individual and community needs, ultimately transforming contradictions into opportunities for growth.

3.4 CHAT in land-based educational contexts

CHAT's systemic perspective makes it particularly suited to examining the integration of digital technologies in land-based education, where practical, hands-on learning and outdoor environments pose unique challenges. In these

contexts, actions such as planning and delivering lessons are often shaped by the unique requirements of outdoor and hands-on environments. Operations, such as the habitual use of traditional teaching methods or tools, can sometimes conflict with new digital strategies, creating contradictions that must be resolved. For instance, faculty members may habitually rely on physical teaching resources, which may not integrate seamlessly with digital platforms. Understanding how these actions and operations manifest provides critical insights into addressing the systemic tensions inherent in these educational settings. By analysing the interactions between activity system elements, this framework provides insights into:

- The socio-cultural dynamics shaping technology adoption.
- The systemic barriers to effective digital strategy implementation.
- The opportunities for innovation and transformation through the resolution of contradictions.

The study, for example, identifies tensions between institutional policies advocating digital transformation and the realities faced by faculty members, such as limited access to reliable internet or inadequate professional development. These contradictions highlight areas where institutional reforms are needed to align strategies with the practical needs of educators (Kaptelinin & Nardi, 2009). Turner et al. (2018) further illustrate how systemic analysis can reveal the interconnectedness of professional learning communities and institutional structures. Their work demonstrates the potential for CHAT to provide actionable insights into the dynamics of teacher development and systemic change.

The study identifies tensions between institutional policies advocating digital transformation and the realities faced by faculty members, such as limited access to reliable internet or inadequate professional development. These contradictions often emerge through the misalignment of actions and operations, where habitual reliance on traditional teaching methods conflicts with the goal-directed processes required to adopt new digital strategies. Addressing these issues highlights the need for institutional reforms to align digital strategies with the practical needs of educators (Kaptelinin & Nardi, 2009).

Turner et al. (2018) further illustrate how systemic analysis can reveal the interconnectedness of professional learning communities and institutional structures when viewed through the lens of actions and operations. For instance, they demonstrate how collaborative practices among

faculty members can resolve contradictions by fostering a shared understanding of institutional goals and operational realities. Their work underscores the potential for CHAT to provide actionable insights into the dynamics of teacher development, systemic change, and the integration of digital tools into educational practices.

3.5 The relevance of CHAT to this study

CHAT's systemic analysis is particularly suited to exploring the socio-technical dynamics of digital technology use in UK land-based institutions. By incorporating the concepts of action and operation, this framework allows for a detailed examination of how faculty members interact with digital tools and how these interactions are shaped by their social practices. Actions, as conscious and goal-directed processes, interact with operations, which are automated or habitual behaviours, to reveal systemic tensions and opportunities for innovation within educational settings.

For example, contradictions often emerge when institutional policies aimed at digital transformation impose ambitious technological adoption goals without adequately considering faculty members' expected reliance on traditional methods. These contradictions manifest in the disconnect between actions, such as integrating digital resources into teaching, and operations, like the routine use of physical teaching aids. This misalignment underscores the necessity of aligning institutional strategies with the social and operational realities of educators.

CHAT also provides a means to analyse broader social practices that influence faculty members' adaptation to new digital strategies. These practices encompass the norms, rules, and community expectations that shape their engagement with technology. For instance, when faculty members face barriers such as inadequate professional development or limited access to reliable internet, their ability to translate institutional objectives into effective teaching actions is constrained. CHAT highlights these challenges by identifying how systemic contradictions hinder the alignment of institutional goals with individual and collective practices.

3.5.1 Strengths

1. *Holistic Analysis:* CHAT's ability to capture the interaction between actions, operations, and systemic structures provides a comprehensive lens for understanding activity systems in education (Bligh & Flood, 2017).

2. *Focus on Transformation:* By emphasising contradictions as catalysts for change, CHAT enables the identification of opportunities for systemic innovation and professional growth (Engeström & Sannino, 2021).
3. *Applicability to Educational Research:* CHAT has proven effective in exploring the digitalisation of education, professional development, and pedagogical transformation across diverse contexts (Pettersson, 2021; Maimaiti et al., 2023). Its applicability to land-based institutions highlights its utility in addressing unique challenges, such as integrating digital tools into outdoor and hands-on learning environments.

3.5.2 Critiques and limitations

While CHAT offers a robust framework for systemic analysis, it has been critiqued for its complexity and the resource-intensive nature of mapping comprehensive activity systems (Foot, 2014). Focusing on macro-level analysis may sometimes obscure individual agency, particularly in dynamic educational contexts where faculty members' personal practices are pivotal (Roth & Lee, 2007).

This study addresses these limitations by combining CHAT's systemic perspective with a detailed analysis of faculty members' actions and operations. By grounding the analysis in the lived experiences of educators, this approach ensures a balanced understanding of how digital strategies can be implemented effectively within land-based institutions.

3.6 Integration with broader theoretical perspectives

CHAT is deeply rooted in the socio-cultural tradition of Vygotsky's work, aligning closely with social constructivism, emphasising knowledge's co-construction through social interaction (Vygotsky, 1978; Palincsar, 1998). This perspective is crucial for understanding how faculty members engage with digital tools, as their actions and operations are inherently shaped by socio-cultural dynamics and collective practices (Herrington & Oliver, 2000; Akpan et al., 2020).

CHAT's systemic approach aligns closely with TEL frameworks, emphasising iterative learning and adaptability. For instance, frameworks like Blended Learning (Graham, 2018) and Adaptive E-learning (El-Sabagh, 2021) focus on resolving systemic contradictions to foster faculty and student engagement. CHAT provides a structured methodology to

enhance TEL practices by addressing tensions within activity systems, bridging the gap between digital tool adoption and pedagogical goals (Engeström, 2008; Sannino et al., 2016).

Moreover, CHAT incorporates a constructivist epistemology, positing that socio-technical activity systems are not only mediators of practice but also mechanisms for reshaping knowledge and realities (Cole, 1996; Houben, 2011). This interpretivist stance underscores the importance of subjective meaning and the interplay between individual and systemic agency in fostering transformative change (Pervin & Mokhtar, 2022). Integrating actions and operations further enriches this perspective, revealing how these processes evolve and influence institutional structures and professional practices.

The concept of the *object* in CHAT highlights the transformative potential of activity systems by serving as the central motivator and guide for activities. Whether the *object* is framed as improving teaching quality or achieving institutional goals, its interpretation by faculty members drives their goal-directed actions and informs their operational habits. This dual perspective of object-oriented activity provides critical insights into how systemic change and innovation unfold in response to the dynamic interplay between institutional goals and individual practices (Kaptelinin & Nardi, 2009; Sannino et al., 2016).

3.7 Conclusion

Engeström's CHAT provides a comprehensive framework for analysing the systemic dynamics of digital technology use in UK land-based institutions. CHAT sheds light on the challenges and opportunities inherent in digital transformation by integrating the concepts of contradictions, expansive learning, and the interaction of actions and operations.

The framework's holistic approach underscores the interconnectedness of institutional structures, pedagogical practices, and technological tools, demonstrating how systemic tensions can catalyse innovation and evolution. The focus on actions and operations enhances this analysis, revealing how habitual behaviours and goal-directed processes shape and are shaped by broader institutional goals. Consequently, CHAT uniquely suits the study's aim of examining and improving digital strategy implementation in land-based educational contexts, offering actionable insights for fostering a more inclusive and adaptive digital ecosystem.

4. Research design

The investigation used an evaluative case study (Tight, 2017; Yin, 2018; Schoch, 2020), which is crucial for assessing technology adoption in United Kingdom (UK) land-based educational institutions. The methodology fits the research well since it aligns with the mid-range theory guiding the study's specific context (Cartwright, 2020) and Engeström's Cultural Historical Activity Theory (CHAT) (1987), the grand theory directing the overall investigation. This case was selected because it represents a typical example of technology adoption practices within this educational sector. By studying Capel Manor College (Capel), the aim was to gain insights into common challenges, successful strategies, and the overall dynamics of technology adoption in similar educational settings.

4.1 Methodological alignment with CHAT

Adopting CHAT (Engeström, 1987) as the theoretical framework required revisiting the methodological approach to ensure alignment with the principles of activity systems. CHAT's emphasis on systemic contradictions informed both the data collection and analysis processes, particularly focusing on identifying tensions between elements such as *rules*, *tools*, and the *division of labour*. The shift to CHAT necessitated considering not only the immediate dynamics of digital tool adoption but also the broader systemic and cultural factors shaping these dynamics.

4.2 Application of the Activity-Oriented Design Method

The Activity-Oriented Design Method (AODM), developed by Mwanza-Simwami (2011), served as a guiding framework for the formulation of the interview questions and the structuring of the semi-structured interviews. Activity-Oriented Design Method provides a systematic approach to characterising and understanding learner and educator experiences with technology by focusing on eight key steps. These steps include identifying the purpose of the activity, the actors involved, the context, the tools used, and the relationships between these elements. By aligning with CHAT, the Activity-Oriented Design Method enables researchers to investigate the dynamic interplay between components of an activity system, making it particularly suited for evaluating educational contexts.

In this study, the Activity-Oriented Design Method was employed to guide the design and implementation of the semi-structured interviews. The method ensured that the questions comprehensively addressed the research focus, exploring how faculty members at Capel use digital technologies within their teaching practices. For instance, the eight steps outlined in the Activity-Oriented Design Method were used to structure questions around the intended outcomes, the roles and responsibilities of faculty members, the tools they use, and the sociocultural factors influencing their practices. This approach provided a robust framework for capturing the constantly evolving relationships between various elements of the activity system, such as *tools*, *rules*, and *community* aspects.

The adoption of CHAT further enhanced the application of the Activity-Oriented Design Method by emphasising the identification of contradictions within and between activity system elements. This refinement allowed for a deeper exploration of systemic tensions, such as mismatches between institutional policies (*rules*) and faculty members' practices (*subject*).

4.3 Research site and participants

The case study was restricted to participants from Capel, a multi-site UK land-based educational institution. The population consisted of a selection of faculty members employed at the multi-sites.

To investigate the technology adoption practices, the participants needed to be familiar with lecturing/teaching/tutoring in this institution's various faculties and departments. The institution offers part-time and full-time further education and higher education programmes from Foundation to Level six, across five campuses. After securing ethical approval, 47 participants from the eleven land-based occupational areas at Capel were invited to participate. Of those invited, 21 participated, which included at least one faculty member from each occupational area involved in teaching.

Participants were selected from: Animal Management; Saddlery, Shoemaking, and Leather Craft; Dog Grooming; Floristry, Event Styling, and Balloon Artistry; Foundation Learning; Maths and English; Horticulture; Garden Design; Agriculture; Environmental Conservation; and Arboriculture. The participants were provided with an information sheet outlining the study's purpose and role, and a consent form requesting their voluntary participation. To maintain ethical standards, the study received approval from the Institution's ethical review board.

4.4 Data collection

The study employed a 45-minute semi-structured interview using Microsoft Teams. This approach balances exploring specific topics and allowing participants to share their experiences and perspectives in detail. The CHAT framework described in the previous section, and the elements of activity illustrated in Figure 1, guided the interview questions, focusing on the critical aspects of technology use, including intended outcomes, activity systems, actions, operations, tools, rules, community aspects, division of labour, contradictions, and transformations.

4.5 Insideriness of the researcher

As a UK land-based further education college lecturer, I find myself at an educational institution operating without a clearly communicated digital strategy and direction and using unsuitable technology. My insider knowledge of the institution and the challenges faculty members face provides valuable context for the study. This personal experience aligns with the study's focus on understanding contradictions in how faculty members communicate, share resources, and face technology challenges. Therefore, I provide viewpoints of participants of various backgrounds to help lessen any potential biases linked with this insider viewpoint.

4.6 Data analysis

The data were analysed using thematic qualitative analysis, which involved identifying repeating patterns, concepts, subjects, and themes from the interviews (Krefting, 1991; Atieno, 2009; Braun & Clarke, 2021; Bailey, 2023). Both semantic and latent-level analyses were employed to ensure a comprehensive data exploration. The semantic analysis focused on the explicit content of the participants' responses, identifying surface-level patterns and themes directly reflected in their words. Conversely, the latent analysis delved deeper into underlying assumptions, conceptual meanings, and sociocultural contexts, aligning with the CHAT framework's emphasis on uncovering contradictions and systemic dynamics.

The thematic analysis was guided by the CHAT framework, which provided the initial coding frame for the data. This method was particularly suitable for exploratory research, as it allowed for discovering new insights and emergent themes from the data.

The thematic analysis followed a structured process to identify contradictions within the activity system elements outlined by CHAT. The analysis was conducted in five key stages:

1. Familiarisation with data: Each transcript was reviewed multiple times to gain an in-depth understanding of participants' experiences and perspectives. Notes were taken to document initial observations related to systemic tensions.
2. Initial coding: Using the CHAT framework, the data were coded based on activity system elements (e.g., *subject*, *object*, *tools*, *rules*, *community*, and *division of labour*). Codes were applied to segments that highlighted recurring patterns or significant tensions. For example, issues with misaligned tools and instructional goals were coded under '*Tools vs Object*.'
3. Theme identification: Codes were grouped into broader themes representing contradictions, such as '*misalignment between tools and educational goals*' or '*inequities in resource distribution*.' These themes were aligned with CHAT's categorisation of contradictions: primary, secondary, tertiary, and quaternary.
4. Contradiction mapping: Contradictions were mapped within and across activity system elements to capture their systemic nature. For instance, a tension between faculty members' training (*division of labour*) and institutional policies (*rules*) was identified as a secondary contradiction.
5. Review and refinement: Themes and mapped contradictions were reviewed iteratively to ensure consistency and accuracy. This involved cross-referencing with Capel's Digital Strategy Policy document to contextualise institutional perspectives.

The process began with an initial pass of coding to identify recurring patterns and themes. Microsoft Teams interview transcripts were downloaded as Microsoft Word documents and anonymised to safeguard participants' identities and maintain confidentiality. A second pass of analysis refined the initial codes and organised them into broader themes and sub-themes, enhancing the depth of understanding of the data.

In addition to the interview data, document analysis was carried out using Capel's Digital Strategy Policy. This document provided critical background data, enabling a comparative analysis between the strategies outlined in the Digital Strategy Policy and the themes emerging from the

semi-structured interviews with faculty members. Identified themes, strategies, and initiatives from the Digital Strategy Policy were used to contextualise the findings, further enriching the thematic analysis.

The initial activity system model (shown in Figure 2) was created to provide a starting point for the study and to represent the faculty members' activity while considering the subjects in the activity system (Al-Ali, 2020). The initial activity system model influenced the formulation of the interview questions and the subsequent data analysis. It was developed iteratively and guided by the principles of CHAT. The initial activity system model was based on the general model of an activity system proposed by Engeström (1987), which includes the following components:

- *Subject*: The faculty members at Capel are the individuals or groups of individuals engaging with technology for educational purposes.
- *Rules*: The formal and informal norms, regulations, policies, and conventions that govern the use of technology within Capel.
- *Community*: All individuals or groups that have a stake in the educational processes at Capel, including faculty members, students, administrative staff, Information Technology support staff, management, and potential parents/carers.
- *Division of labour*: The distribution of tasks, responsibilities, and roles among the community members. This involved Capel members who are responsible for creating digital content, providing technical support, allocating administrative duties related to technology, and defining their roles in online learning environments.
- *Tools (Artefacts)*: These include the physical and digital tools that faculty members and students use to facilitate teaching and learning. At Capel, these are computers, software (such as Microsoft Teams, SharePoint, and Capel's old version of Moodle), educational platforms, digital resources, and other technologies employed in the educational process.
- *Object*: The goal or motive behind the activity, i.e. to facilitate effective teaching and learning through technology. It is the most crucial element in understanding the activity system. In this case, the object refers to the goals and objectives that faculty members are working towards when using educational technologies in their teaching practices.

- *Outcomes*: The results or products of the activity system, including improved learning experiences, enhanced digital literacy among faculty members and students, increased efficiency in resource sharing and communication, and potentially the identification and resolution of contradictions within the system that hinder the effective use of technology.

4.7 Ethical considerations

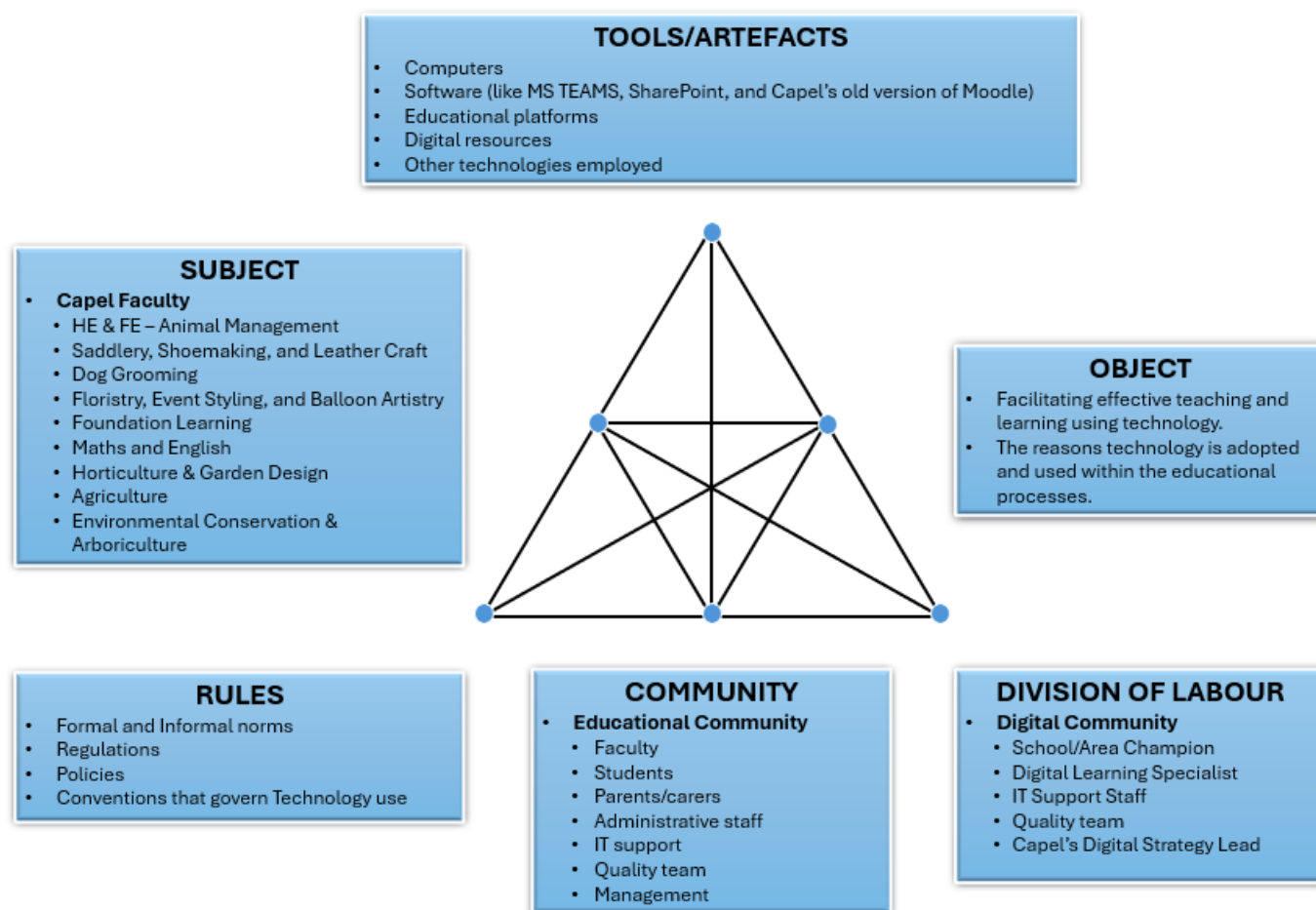
Ethical issues included informed authorisation, guaranteed anonymity, and institutional ethics that were approved and implemented (Lancaster University, n.d.). Other ethical issues focused on friendly and open communication with the participants and responsible private data management (Shamoo & Khin-Maung-Gyi, 2021).

5. Findings

This section presents the key barriers to successfully implementing digital technologies in United Kingdom (UK) land-based institutions. The findings of this study are grounded in the theoretical framework of Engeström's Cultural Historical Activity Theory (CHAT) (1987), which allows for a systemic analysis of the dynamics underpinning digital technology use in educational settings. Central to this analysis is the development of activity system models, which provide a comprehensive view of the interrelations between system elements. In the research design, the initial activity system model at Figure 2 offered a conceptual starting point, mapping the interactions of faculty members at Capel Manor College (Capel) based on the theoretical underpinnings of CHAT and preliminary observations.

In the findings, this conceptual groundwork evolves into a refined and empirically informed model: the "*Activity system model: Capel faculty members and students*" (Figure 3). This model synthesises the findings derived from participant interview data and institutional document analysis, offering a nuanced depiction of the systemic interactions and tensions that influence the integration of digital technologies at Capel. The updated model builds on the initial framework, incorporating the contradictions identified through thematic analysis.

Figure 2. Initial activity system model for Capel, facilitating effective teaching and learning using technology



5.1 Contextual overview of the activity system model

The activity system model: Capel faculty members and students (Figure 3) encapsulates the key elements of faculty members' engagement with digital tools within the educational environment at Capel. The model highlights the dynamic interplay between *subjects* (faculty members), *objects* (educational goals), *tools* (digital technologies), *rules* (institutional policies), *community* (stakeholders including students, administrators, and support staff), and the *division of labour* (role allocation and responsibilities). These elements collectively shape the outcomes of teaching and learning practices while simultaneously giving rise to systemic contradictions.

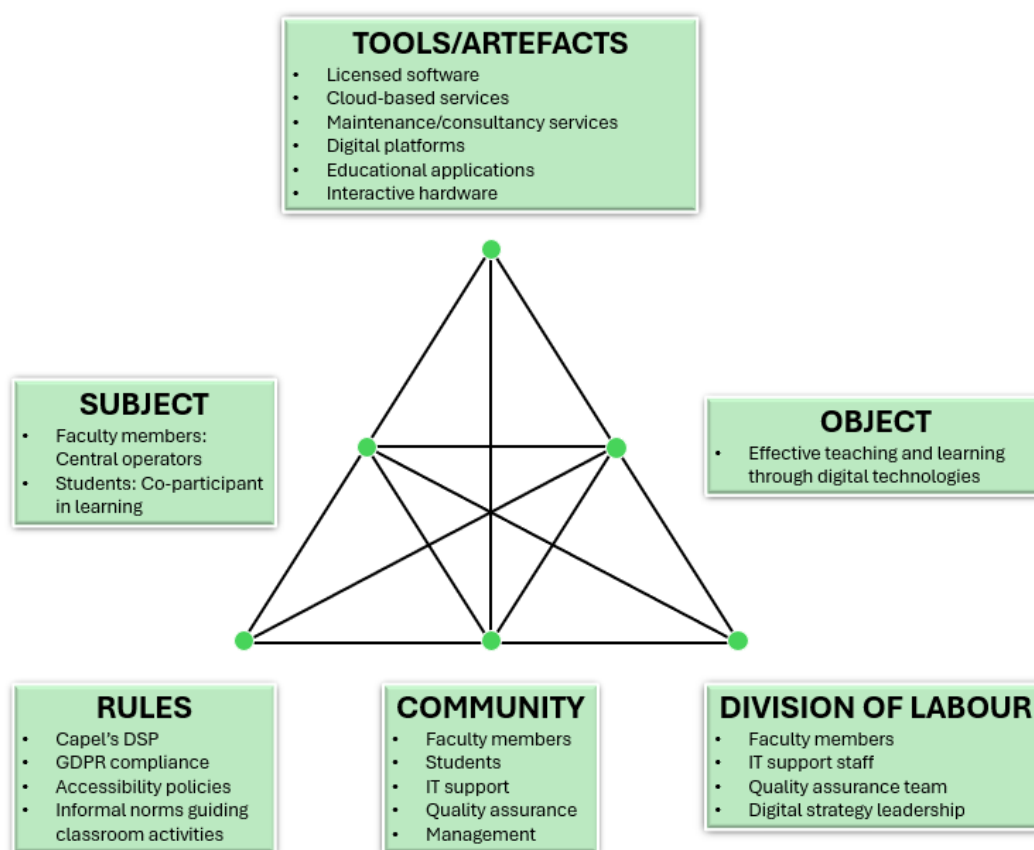
The activity system model offers a clear and comprehensive view of the elements shaping Capel's digital ecosystem, highlighting both challenges and opportunities. Unlike

the initial model at Figure 2, which provided a theoretical foundation, this refined version incorporates empirical data to pinpoint systemic tensions and provide practical insights into the factors affecting digital technology adoption.

5.2 Purpose and emphasis of activity system model: Capel faculty members and students

The primary purpose of the activity system model: Capel faculty members and students (Figure 3) is to illustrate how the institutional and social practices at Capel influence faculty members' engagement with digital technologies. By visually mapping the activity system, the model serves as a diagnostic tool that identifies contradictions—the tensions and misalignments between elements—which can act as both barriers and drivers of systemic change.

Figure 3. Activity system model: Capel faculty members and students



5.3 Unpacking the activity system model: Capel faculty members and students

To facilitate a clear understanding of the activity system model: Capel faculty members and students (Figure 3), the following subsections will examine:

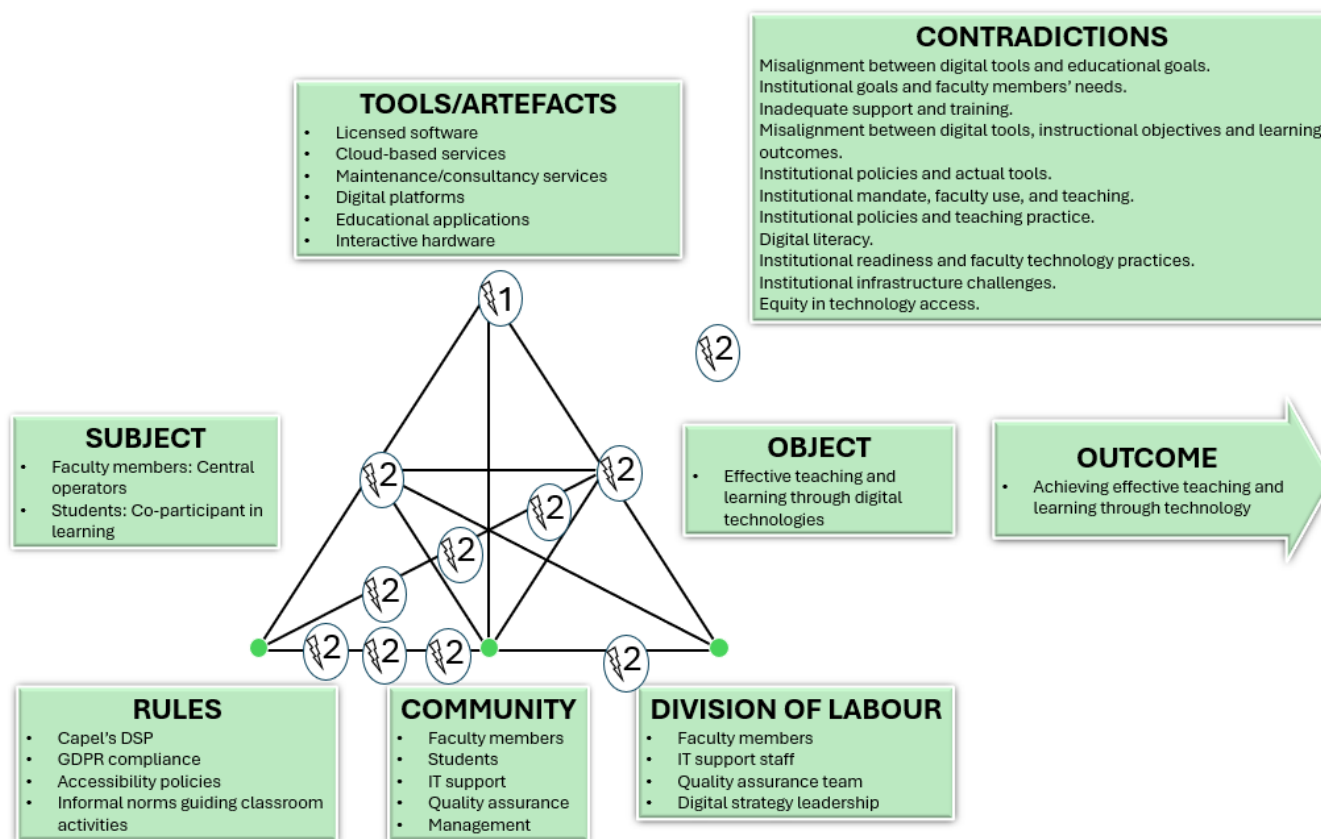
- *Subject*: Faculty members as the primary agents of digital technology use.
- *Object*: The educational goals and motives driving technology integration.
- *Tools*: The digital technologies and resources mediating teaching and learning practices.
- *Rules*: The explicit and implicit policies governing technology use at Capel.
- *Community*: The broader network of stakeholders, including students, administrators, and support staff.
- *Division of labour*: The roles and responsibilities distributed among community members.
- *Outcome*: The intended and unintended results of technology integration efforts.

Each component will be contextualised within the broader systemic dynamics, emphasising the contradictions that emerge within and between these elements.

5.4 Transition to analysis of contradictions

Following this introduction, the findings will delve into the specific contradictions identified through the analysis of participant interviews and institutional documents. These contradictions will be mapped back to the activity system model: Capel faculty members and students (Figure 3), illustrating how they manifest within the activity system and their implications for digital strategy implementation at Capel. By anchoring the activity system model discussion, these findings aim to provide a coherent and structured narrative that connects theoretical insights with practical challenges, offering pathways for systemic improvement.

Figure 4. Activity system model: inclusive of contradictions



The findings reveal significant contradictions related to the *tools* provided by institutions, which often fail to meet the practical needs of faculty members and students in achieving the intended *object* of effective teaching and learning. Faculty members highlighted issues such as inadequate access to digital resources, outdated hardware, and misaligned tools that disrupt achieving desired learning *outcomes*.

Similarly, tensions were observed between *rules* and the *community*. Institutional policies, such as those advocating for equitable access to technology and professional development, frequently fell short in implementation. Faculty members reported inconsistencies in resource allocation, vague policy enforcement, and inequities across campuses, particularly in rural or under-resourced settings.

The relationship between *division of labour* and *community* further revealed systemic inefficiencies. Faculty members expressed frustration with unclear role definitions,

fragmented support systems, and insufficient collaboration, which hindered their ability to integrate technology into their teaching practices effectively.

Additionally, contradictions emerged between the *object* and the *outcome*, where the intended learning goals were undermined by systemic barriers such as limited digital literacy among faculty members and students, insufficient training, and a lack of alignment between institutional goals and the realities of classroom implementation. These tensions highlight the gap between aspirations and on-the-ground practices.

Through the lens of CHAT, this chapter provides a detailed analysis of these barriers and contradictions, illustrating how they manifest within the activity system and impact the broader context of UK land-based education. Each finding is contextualised within CHAT principles to underscore the interdependencies between the elements, and their influence on teaching and learning practices, illustrated in Figure 4.

5.5 Alignment of digital tools with educational goals

This subsection examines how digital technologies align with educational goals from the CHAT perspective. The data were obtained from faculty members' perspectives about using particular tools to achieve their learning goals. The data suggest that there is often a misalignment between the digital tools and resources available to faculty members (*object*) and the actual learning objectives they are trying to achieve (*object*).

5.5.1 Misalignment between digital tools and educational goals (Tools/Artefacts)

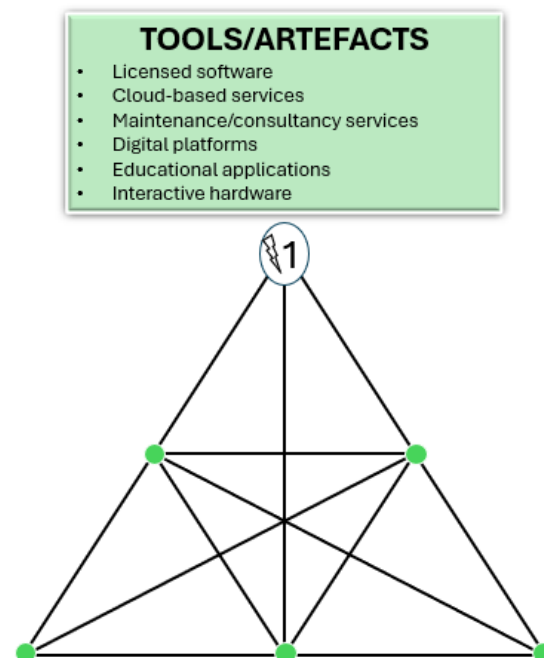
A primary contradiction exists within the activity system, characterised by a misalignment between the digital tools provided (*artefacts/tools*) and the educational objectives they are designed to achieve (*object*) (Figure 4). This misalignment manifests through a range of systemic barriers, including insufficient access to essential resources, outdated infrastructure, fragmented technological systems, and inadequate institutional support. These barriers hinder educators' ability to meet learning outcomes, create tension within the activity system, and ultimately affect the effectiveness of teaching and learning in land-based education.

The findings highlight that while educators recognise the potential of digital tools to enhance teaching, the lack of alignment between institutional provisions and pedagogical needs undermines their utility. Addressing the misalignment between tools and educational goals enables more effective use of technology in teaching practices. For example, ensuring that digital tools support hands-on learning objectives can significantly enhance student engagement and learning effectiveness, key technology-enhanced learning (TEL) goals (Bligh & Flood, 2017; Kundu et al., 2020; Backfisch et al., 2021). This is exacerbated by inconsistent policies, resource inequities, and limited training opportunities, creating frustration and inefficiencies in delivering technology-enhanced education. Through participants' voices, these contradictions are illustrated with examples that reveal their pervasive impact on teaching practices and learning experiences across diverse subjects and levels. The first example is a primary contradiction in the activity's tools/artefacts, illustrated in Figure 5, represented by participants as misalignment between their digital tools and educational goals.

For example, Participant 1 (P1¹) highlighted the unavailability of critical resources, such as past exam papers, which undermines exam preparation for students:

¹ P1 refers to the first participant. Pattern followed throughout study.

Figure 5. Misalignment between digital tools and educational goals



...I have suggested purchasing a license for Tom Newby Past Papers. I discussed with the Curriculum Leader, and our external moderator suggested we pay a subscription... to have access to a lot of past papers and questions... but no, in general, no. (P1)

This example highlights the need to align institutional resources with teachers' practical needs, such as providing access to subject-specific materials, to improve teaching outcomes.

Similarly, P3 emphasised the challenges of acquiring essential software licenses for higher-level courses:

We use SPSS for level 5 and R for level 6, but there's a lot of liaising involved to ensure students have the required licenses. We often rely on free alternatives, which are not always intuitive or sufficient. (P3)

This case underscores the importance of ensuring software tools are accessible and aligned with curriculum needs to support both teachers and students effectively.

Participants also emphasised the importance of tools that support visual and interactive teaching. P6, described the inequities in hardware distribution:

Currently in my classroom, we have no Interactive Whiteboard. This makes it difficult with some of my lessons because I can't use that to display games or get the students up. It's just old-fashioned teaching techniques... but when I do have access, it makes a world of difference. (P6)

Equitable access to modern teaching tools, such as interactive whiteboards, is crucial for fostering student engagement in TEL. These findings align with TEL frameworks, such as Adaptive E-learning, emphasising the need for tools that adapt to diverse instructional contexts (El-Sabagh, 2021). For land-based education, adopting portable and context-specific tools could mitigate barriers like unreliable internet connectivity, ensuring that digital strategies support the experiential and collaborative nature of this field. For example, interactive whiteboards enable the integration of multimedia resources that appeal to diverse learning styles, making lessons more dynamic and inclusive. In land-based education, tools that support real-time data analysis or interactive mapping could similarly transform how students engage with complex, real-world problems.

Moreover, P21 discussed the use of mobile apps like www.picturethisai.com for plant identification as a practical tool during fieldwork:

We use apps like Picture This for plant identification, and it works great 95% of the time. But we lack broader institutional support for other innovative tools that could enhance these learning activities. (P21)

Such feedback demonstrates the potential of technology to bridge gaps in experiential learning but also reveals limitations in institutional backing.

These barriers extend beyond specific tools to broader systemic issues, including outdated infrastructure, fragmented platforms, and inadequate training.

P11 noted accessibility challenges, particularly for students with disabilities:

I share PowerPoints directly with students so they can access them on their devices. The lack of accessible infrastructure makes it harder to ensure inclusivity. (P11)

Educators also described resource gaps for specific practical applications. P16 discussed the lack of accessible databases for vocation-specific students, necessitating workarounds:

We created simulated Excel spreadsheets to mimic real-world tree valuation data because we didn't have access to professional tools. It's not ideal, but it gets the job done. (P16)

Further illustrating these constraints, P10 highlighted limitations in hybrid learning during the pandemic:

I had to use my own technology for teaching during lockdown. There was no support for creating interactive remote lessons, which was frustrating and unsustainable. (P10)

P18 emphasised the financial constraints preventing the broader adoption of tools:

Tools like Nearpod are great, but the cost prevents widespread use. Without budget allocation, it's impossible to adopt these tools fully. (P18)

P4 pointed to inefficiencies stemming from outdated tools like Capel Manor College's (Capel) Moodle version and inconsistencies in transitioning to more modern platforms:

We were told to avoid Moodle this year, even though it's a good base for storing stuff. Now we rely on MS Teams, but not everything has been migrated properly. This creates confusion and extra work. (P4)

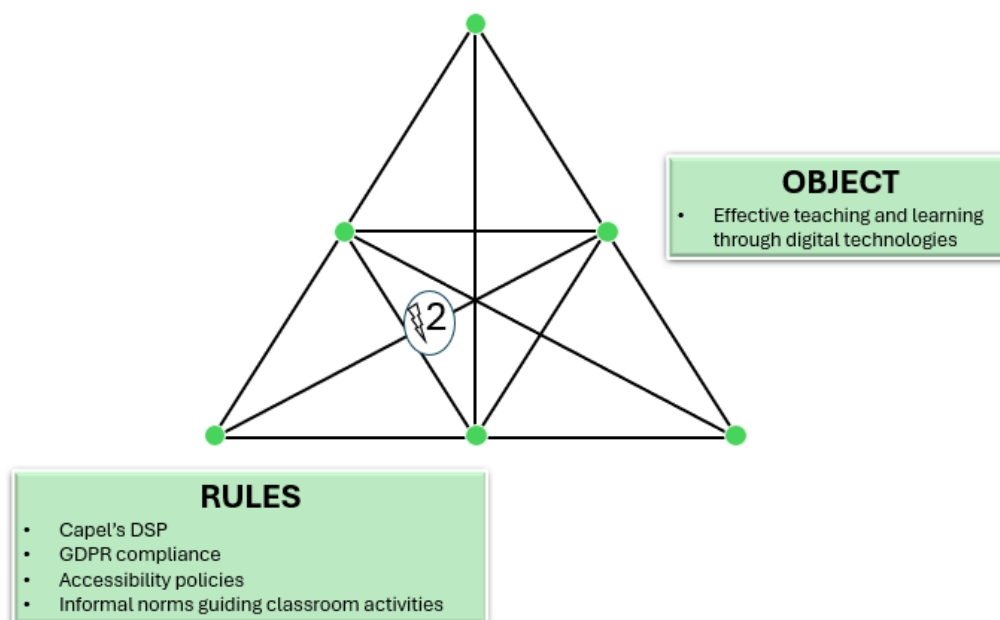
P14 observed challenges in assignment submission due to inconsistent processes:

This year, we allowed students to upload assignments on MS Teams, but it's harder to enforce deadlines. Last year's paper-based system was inefficient but more consistent. (P14)

The lack of training and support for new digital tools further exacerbates these issues, as noted by P7:

We're introduced to tools like Canva or Nearpod but without proper training. It's hard to integrate them fully into our lessons. (P7)

This gap in professional development leaves educators underprepared to align technology with their teaching goals.

Figure 6. Institutional goals and faculty members' needs

These findings demonstrate the ingenuity of educators in adapting to resource limitations, but they also expose systemic issues. The reliance on individual effort rather than institutional support to integrate technology points to a broader misalignment. While some tools have been used creatively, the lack of consistent access, training, and infrastructure creates significant barriers that hinder the alignment of digital tools with educational goals.

5.5.2 Institutional goals and faculty members' needs (Rules vs Object)

This subsection highlights a secondary contradiction within Capel's Digital Strategy Policy (*rules*), arising from tensions between the institution's commitment to providing a resilient and adaptable digital environment and the practical requirements identified by educators (*object*). The findings reveal systemic barriers that hinder the effective use of digital tools and resources, as expressed by multiple participants (Figure 6).

P1 emphasised the difficulty in securing the necessary resources for exam preparation:

I suggested purchasing a license for Tom Newby Past Papers, which would help significantly with exam preparation, but this was not supported by the institution. (P1)

This disconnect underscores the gap between institutional strategies and faculty member-identified priorities for enhancing teaching outcomes.

Similarly, P10 raised concerns about the lack of institutional support during remote teaching:

We never got any laptops for lockdown. I had to use my personal device, and there were problems with logging into Microsoft 365, leading to data syncing errors between my work and private accounts. (P10)

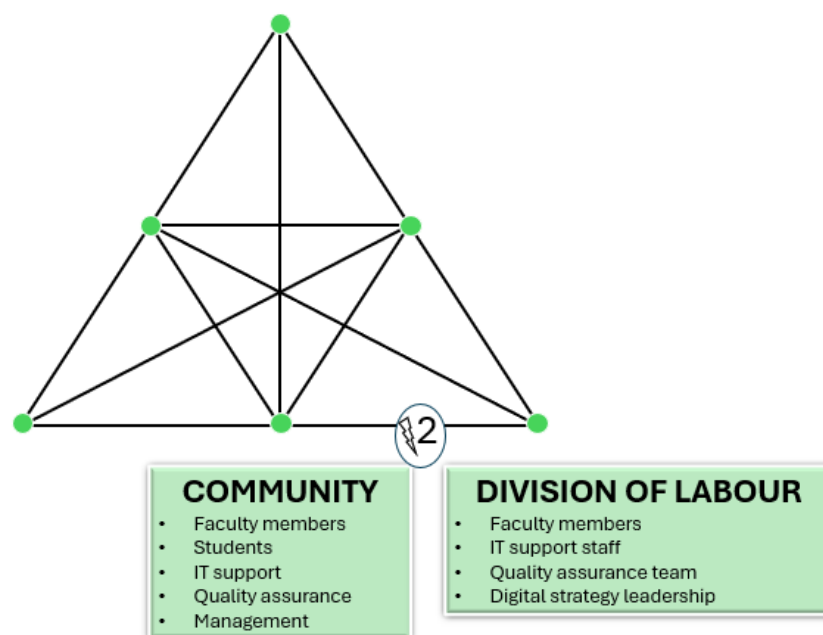
This illustrates the importance of institutional readiness and resource allocation to support educators during transitions, such as the shift to remote teaching.

P18 pointed out systemic inefficiencies in the institution's digital systems:

ProMonitor is not user-friendly or aligned with our needs. We've repeatedly asked for better systems like ProSolutions, but these requests are consistently denied. (P18)

Such inefficiencies exemplify the broader issue of institutional resistance to adopting more suitable tools for faculty members.

Figure 7. Inadequate support and training



P21 described the one-size-fits-all nature of institutional policies that fail to address diverse faculty members and student needs:

Policies designed for 16–18-year-olds don't fit our adult students. The lack of differentiation in support systems creates barriers for effective engagement. (P21)

This highlights how rigid rules exacerbate challenges for educators working with non-traditional student groups.

P17 raised the issue of delayed resource allocation:

There's a lag between requesting resources and receiving them. This delay often forces us to find workarounds, adding to our workload. (P17)

Such delays demonstrate a misalignment between institutional objectives and the timely execution of faculty members' needs.

P11 highlighted constraints caused by excessive restrictions on accessing teaching resources:

Many potentially valuable resources are inaccessible due to firewalls. This limits our ability to adapt to student needs in real-time. (P11)

These restrictions further inhibit educators from fully utilising digital tools to enhance learning outcomes.

Lastly, P6 shared frustrations regarding the lack of essential classroom infrastructure:

Interactive whiteboards are missing in many classrooms, limiting our ability to create engaging, interactive lessons. It's as if the institution says one thing about innovation but doesn't follow through in practice. (P6)

This illustrates the disparity between policy rhetoric and on-the-ground realities for educators.

5.5.3 Inadequate support and training (Division of labour vs Community)

This subsection examines a secondary contradiction within Capel's activity system, highlighting the tension between the *division of labour* and the *community* in providing adequate support and training for digital technology use (Figure 7). These tensions arise from misaligned institutional priorities, insufficient resources, and unclear role allocations, which collectively hinder educators' ability to integrate technology effectively into their teaching practices. Faculty members repeatedly cited issues such as inadequate training, delayed responses, and reliance on informal support systems, all perpetuating frustration, inefficiencies, and missed opportunities for effective technology adoption.

P7 underscored the inadequacy of training and the reliance on self-teaching, which often results in trial-and-error learning:

If you're not getting training and you're just fiddling your own way through it, then you're not going to know, and it's going to be trial and error. (P7)

This case shows the need for structured and ongoing training programmes to build educators' confidence and competence in using digital tools.

P16 noted significant delays in accessing support for specialised tools, highlighting a lack of readiness to implement advanced systems:

We are waiting for someone to come in and show us how to programme the Cricut machine so it can be used in lessons. Until then, it's just sitting there. (P16)

Such delays reflect a misalignment between the institution's provision of tools and the necessary training to utilise them effectively.

Similarly, P19 described challenges with outdated training methods and an absence of effective digital skill-building resources for staff:

There's no structured training to help us move from old systems like Z-drives to modern platforms like SharePoint. We're left to figure it out ourselves, which is frustrating. (P19)

This tension exacerbates feelings of disconnection within the community, as staff must independently bridge gaps in knowledge.

P21 identified gaps in Information Technology support for non-standard tools or software, leaving faculty members to search for solutions independently:

If we're using apps that the IT department isn't familiar with, we end up Googling for answers or reaching out to app developers directly. (P21)

The lack of cohesive support mechanisms further isolates faculty members who rely on non-standard technologies in their teaching.

P6 emphasised the insufficiency of continuous professional development sessions, which are often too short to build meaningful expertise:

You can't do technology training in an hour. Longer sessions are needed to ensure we understand the tools properly. (P6)

The limited scope of training sessions perpetuates a cycle of underutilisation and ineffective technology integration.

P10 highlighted the lack of clarity in role distribution for supporting technology, leading to inefficiencies:

I don't know who is responsible for what—whether it's IT, Quality, or someone else. There's no clear point of contact for resolving issues. (P10)

This ambiguity further complicates faculty members' efforts to seek help and resolve technological challenges in a timely manner.

Finally, P5 pointed to reliance on informal peer mentoring as a stopgap for institutional training gaps:

We have stronger tech users who support colleagues informally, but this isn't a replacement for proper training programmes. (P5)

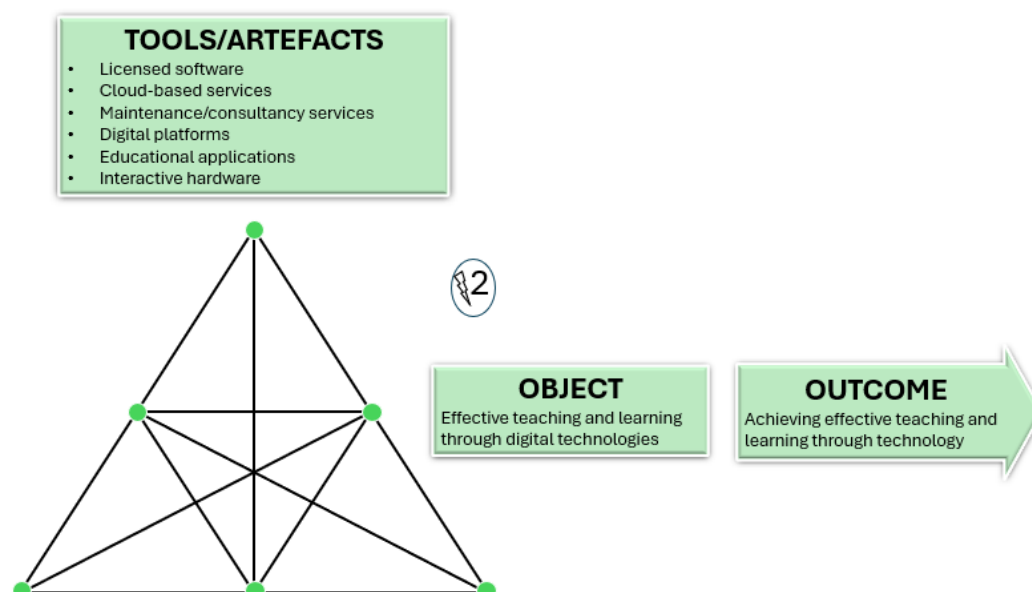
While this informal system provides temporary relief, it underscores the broader institutional failure to create robust support structures for faculty members.

5.5.4 Misalignment between digital tools, instructional objectives, and learning outcomes (Tools vs Object vs Outcome)

This subsection explores a secondary contradiction within the activity system where digital tools (*tools*) fail to align with instructional objectives (*object*) and the desired learning outcomes (*outcome*) (Figure 8). These tensions arise as a source of conflict between the assumptions embedded in tool design and the realities of classroom implementation. For example, tools like Microsoft Excel, assumed to be universally accessible, expose gaps in student proficiency, making it challenging to integrate data analysis effectively into lessons. Similarly, online-focused platforms like Nearpod, while useful during remote learning, struggle to engage students in traditional classroom settings. These misalignments disrupt lesson plans and hinder student engagement and their ability to achieve learning outcomes.

P3 highlighted challenges arising from student proficiency gaps in digital tools, specifically Microsoft Excel, a critical tool in many lessons:

Figure 8. Misalignment between digital tools, instructional objectives, and learning outcomes



We see in the students when we have to provide them a little bit more help because the number of them that didn't know how to use Excel, and they were level fours, was kind of crazy. (P3)

This mismatch between expected and actual student capabilities disrupts lesson plans and negatively impacts learning outcomes.

Similarly, P18 reflected on difficulties adapting online-focused tools like Nearpod for in-person instruction:

Nearpod is an excellent resource when teaching online, but more often than not now, we're not teaching online. It's harder to integrate it into a normal lesson effectively. (P18)

This highlights the importance of selecting tools that can adapt to multiple teaching contexts, including online and in-person instruction.

P20 discussed missed opportunities due to time constraints and limited training for advanced tools such as thermal cameras:

I need to put into practice the use of the thermal camera with digital imaging, but I just don't have time to learn and integrate it properly. (P20)

Such barriers prevent the adoption of innovative technologies that could enhance hands-on learning experiences.

P12 described the critical role of scaffolding and differentiated digital activities to meet varying student needs:

If you have online resources, for example, a quiz, you can have one that is more basic and one that is more advanced. This gives faster students something else to do while others catch up. (P12)

This approach supports learning outcomes and emphasizes that additional planning and preparation are required.

In terms of infrastructure, P11 highlighted the gap between desired and available resources:

We would love it as a maths department if all our students had iPads so they could write stuff onto their iPad, and we could see instantaneously. But we've got a long way to go before we catch up to that kind of technology. (P11)

The lack of interactive devices limits student engagement and the alignment of digital tools with teaching objectives.

Finally, P6 pointed out the utility of visual tools like Nearpod for health and safety modules, which students often find disengaging:

Students need something that's going to engage them and keep them on task. I've used Nearpod for health and safety elements, so they can see what questions they've got wrong and what to focus on. (P6)

This underscores the importance of adaptive tools in capturing student interest and driving outcomes.

5.6 Institutional policies and implementation practices

Another recurring discrepancy from the 21 interviews collected is that institutional policies and implementation challenges posed a significant challenge for faculty members. This presented a gap in integrating digital technologies and teaching practices. The data reveal insights into how faculty members viewed institutional policies and the implementation practices of digital tools. The conclusion to these discrepancies was obtained from evaluating the data from the faculty member's perspective and gaining insights into how they viewed institutional policies and the implementation practices of digital tools. I specifically looked at faculty members' personal experiences to share their challenges and recommendations for changing the focus of TEL from external involvement to meaningful learning opportunities.

5.6.1 Institutional policies and actual tools (Rules vs Tools)

This subsection examines the secondary contradictions arising between institutional policies (*rules*) and the digital tools (*tools*) provided to faculty members (Figure 9). These contradictions, often characterised by misalignment between policy frameworks and the practical realities of teaching, reveal systemic barriers that impede the effective implementation of digital technologies in teaching practices. These include inconsistencies in tool accessibility, vague policy enforcement, and a lack of consideration for diverse teaching environments and learner demographics.

P21 highlighted the challenges of blanket policies that fail to account for diverse student demographics, particularly adult learners:

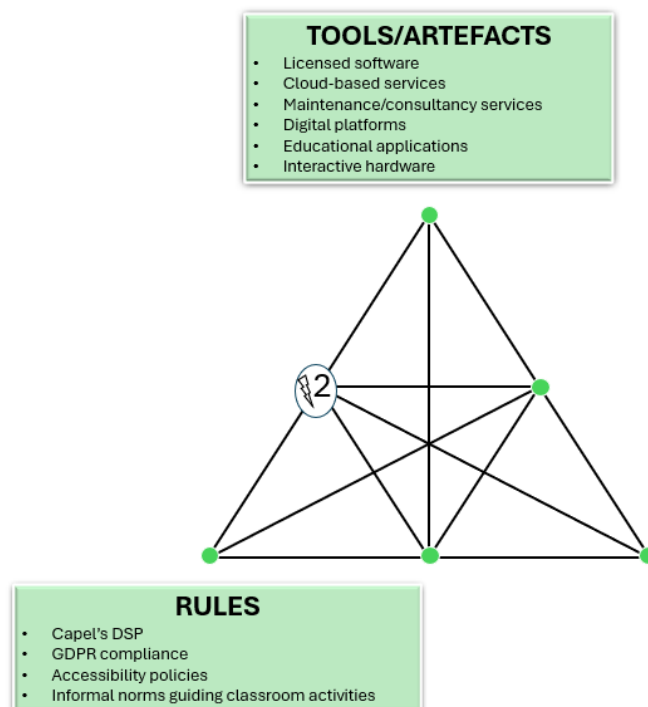
We constantly have blanket edicts that come out that are focused on supporting 16- to 18-year-olds, and it does not fit and it does not land well with adults. (P21)

This mismatch creates a disjointed teaching environment where policies do not align with the practical needs of faculty members.

Similarly, P20 emphasised the restrictions imposed by institutional firewalls that block access to essential online resources:

The firewall blocks my choices of apps I use... it's time-consuming to pre-check everything to ensure it's appropriate for students. (P20)

Figure 9. Institutional policies and actual tools



This institutional control reduces the efficiency of lesson preparation and limits the range of tools available for teaching.

P16 discussed the reputational damage caused by poorly researched investments in technology, such as an underutilised Virtual Reality suite:

The VR kit turned out to be a complete gimmick and did more damage... now the team thinks virtual learning is useless. (P16)

Such decisions contribute to a culture of resistance toward adopting new tools, compounding existing challenges.

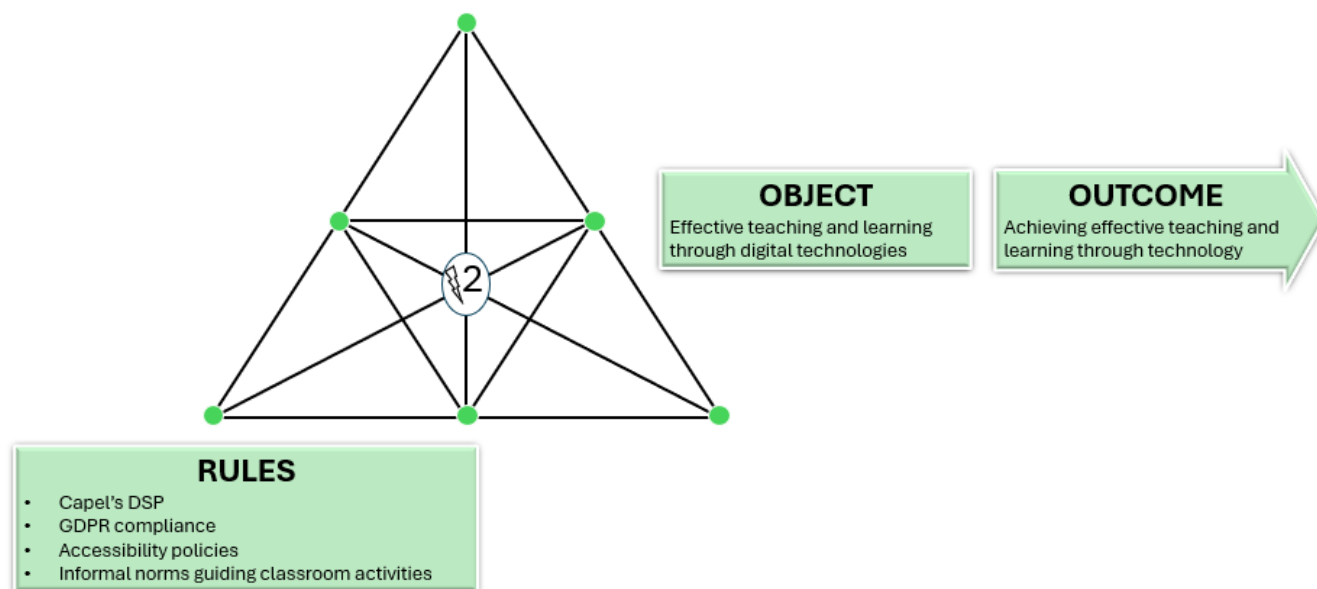
P7 described vague or outdated policies that lack clarity or enforcement mechanisms:

I don't know if it's 100% strived for using different technologies... policies don't seem reinforced, and it's hard to know what's expected. (P7)

This absence of clear guidelines results in inconsistent application of technology in classrooms.

P10 highlighted the confusion caused by conflicting departmental guidance on data protection practices:

Figure 10. Institutional mandate, faculty members' use and teaching



I'm in breach of the law, I think, by photographing students for marketing, but safeguarding says I shouldn't take pictures on my private phone. (P10)

Such contradictions undermine faculty members' confidence and complicate the integration of digital tools.

P3 noted that policies promoting tools like Nearpod often fail to address their limited utility in non-remote learning contexts:

Nearpod is very much if you're teaching online, it's an excellent resource, but more often than not now, we're not teaching online. (P3)

This highlights the need for policies that reflect the dynamic nature of teaching environments.

P18 expressed frustration with the lack of investment in user-friendly systems:

ProMonitor is just not set up efficiently at all... we need ProSolutions, but they won't pay for it. (P18)

The resistance to adopting suitable tools exacerbates inefficiencies and limits teaching effectiveness.

Lastly, P11 described the inconsistency in technology provision across campuses and the reliance on personal devices to bypass institutional barriers:

Sometimes you want to use a website and it's blocked... I just gave up and decided to carry something that works. (P11)

This demonstrates the gap between policy intentions and the realities faculty members face in their day-to-day teaching.

5.6.2 Institutional mandate, faculty members' use and teaching (Rules vs Object vs Outcome)

This subsection examines the secondary contradictions arising between institutional mandates (*rules*), faculty members' use of technology (*object*), and the resulting teaching outcomes (*outcome*) (Figure 10). These contradictions often manifest when institutional policies intended to establish standardised practices and improve efficiency fail to address teaching environments' practical realities and nuanced needs. Faculty members frequently encounter systemic barriers, such as inadequate resources, conflicting policies, and poorly supported technologies, which collectively hinder their ability to deliver effective instruction and achieve desired educational outcomes. The gap between institutional goals and faculty members' needs highlights a critical misalignment, resulting in additional workloads, inconsistent technology adoption, and reduced learning effectiveness.

P10 expressed frustration with conflicting institutional policies that create barriers rather than support. For example:

I get conflicting messages—marketing says I need to take photos of students for promotional purposes, but safeguarding policies say I shouldn't use my personal phone for this. It's impossible to meet all these requirements at once. (P10)

This conflict reflects a broader issue where institutional mandates fail to address practical implementation constraints.

P16 highlighted the tension caused by policies restricting certain technologies like WhatsApp due to data security concerns:

WhatsApp is banned because of data protection issues, but MS Teams doesn't provide the same flexibility for instant communication with students and staff. It's harder to build that rapport. (P16)

Such restrictions create communication gaps that impact both teaching and learning outcomes.

P18 emphasised how inefficiencies in mandated systems, such as ProMonitor, hinder faculty members from achieving desired outcomes:

ProMonitor is not set up efficiently. We need ProSolutions, but they won't pay for it. It just doesn't meet our teaching needs or help us track student progress effectively. (P18)

This mismatch demonstrates how institutional policies prioritise compliance over usability, adding to faculty members' workloads without improving teaching outcomes.

P21 highlighted the challenges of enforced technologies that lack utility for students:

We're told to use ProPortal for tracking, but students find it unhelpful. It's useful for quality audits, but it doesn't benefit tutors or students in their day-to-day work. (P21)

This reveals a disconnect between the tools mandated by policies and their practical value in supporting teaching and learning.

Similarly, P7 discussed the ambiguity and lack of reinforcement in institutional policies promoting technology use:

There's no real enforcement of tech policies. Some use it a lot, others barely engage. It feels like it's not a priority despite being mentioned as an institutional goal. (P7)

This inconsistency leaves faculty members uncertain about expectations, resulting in uneven technology adoption across departments.

P14 highlighted the lack of clear communication about the *division of labour* in managing and supporting digital tools:

I don't know who is responsible for what—whether it's IT, the Quality team, or Digital Learning Support. It's a guessing game most of the time. (P14)

This lack of clarity further complicates the implementation of institutional mandates.

Lastly, P6 emphasised the significant delays in setting up and operationalising newly acquired tools, which ultimately hinder the integration of these resources into teaching and negatively impact outcomes:

We have a Cricut machine for event styling, but it can't be used until someone programmes it. These delays stop us from incorporating it into lessons effectively. (P6)

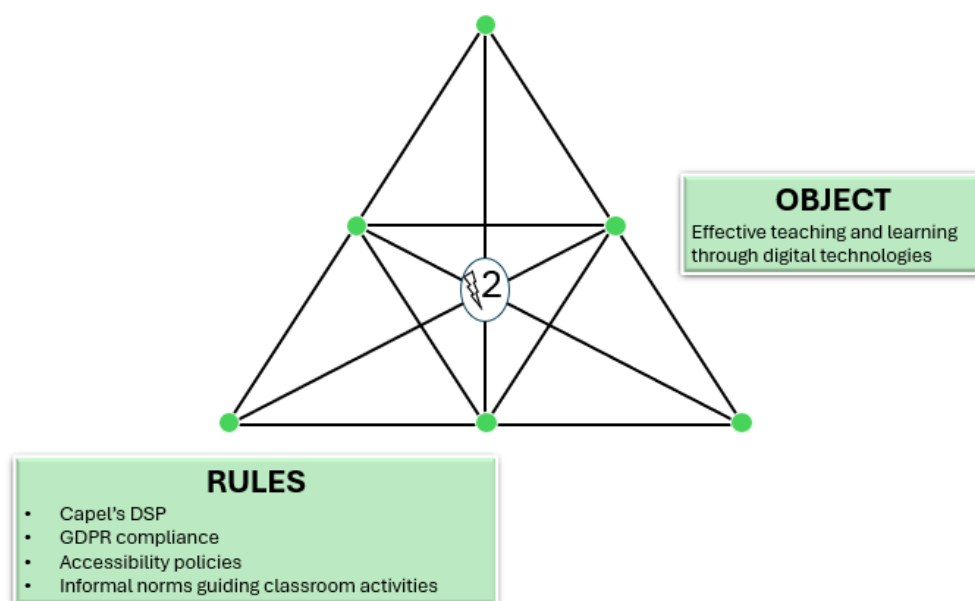
This highlights how insufficient infrastructure readiness undermines faculty members' efforts to meet institutional objectives.

5.6.3 Institutional policies and teaching practice (Rules vs Object)

This subsection examines the secondary contradictions arising between institutional policies (*rules*) and teaching practices (*object*) (Figure 11). Faculty members reported encountering significant barriers where institutional guidelines, often vague or poorly aligned with teaching realities, failed to support their needs effectively. These contradictions manifested in the form of unclear expectations, insufficient resources, and outdated infrastructure, which collectively hindered the effective integration of digital tools and the achievement of teaching objectives. Such systemic misalignments exacerbate inefficiencies, increase workloads, and limit pedagogy innovation opportunities.

P2 described the extensive time required to adapt teaching resources to meet institutional priorities for inclusivity without sufficient policy support:

Figure 11. Institutional policies and teaching practice



I try to make sure PowerPoints represent different ethnic backgrounds to be inclusive, especially because our campus is predominantly white. But it takes hours, sometimes a full day, to prepare materials that meet these expectations. There's no policy support for this; it's just something I feel I have to do. (P2)

This highlights the strain on faculty members who attempt to align with institutional values in the absence of structured guidance.

P7 expressed frustration at the lack of clarity and enforcement surrounding technology policies:

I know the quality department wants us to use more technology, but I haven't seen clear policies enforced. It feels like we're on our own to decide how much technology to integrate into lessons. (P7)

This lack of policy reinforcement results in inconsistent adoption of technology across departments.

P18 pointed to the inefficiency of mandated systems, such as ProMonitor, which fail to meet teaching needs:

ProMonitor doesn't do what we want. We need Pro-Solutions, but they won't pay for it. It's just not set up properly, and the quality suffers because the tools are not there. (P18)

This disconnect illustrates how institutional policies prioritise administrative compliance over usability, adding to faculty members' workloads.

P21 highlighted how blanket policies fail to address the differing needs of adult learners compared to younger students:

Policies are focused on younger students and don't align with what adult learners need. This disconnect makes it difficult to design lessons that work for both groups. (P21)

This reveals the challenge of applying uniform policies in diverse educational contexts.

P6 discussed delays caused by infrastructure readiness, which prevent alignment between teaching and industry standards:

We have a Cricut machine for event styling, but it's unusable until someone programmes it. These delays stop us from incorporating it into lessons effectively. (P6)

Such delays limit the ability of faculty members to deliver industry-relevant skills to students.

P11 noted a reliance on personal resources to overcome institutional technology shortcomings:

Sometimes I want to use a website, but it's blocked. I've given up trying to rely on institutional tech and now bring my own laptop to ensure I can teach effectively. (P11)

This reliance reflects systemic inadequacies in institutional technology support.

These examples highlight a persistent misalignment between policy directives and the practical requirements of teaching, which exacerbates inefficiencies and hinders faculty member's ability to innovate and achieve their objectives.

5.7 Digital literacy and professional development

Digital literacy and professional development emerged as a recurrent theme in the interviews. This highlighted the importance of faculty members gaining skills and training on technological advancements for land-based education. In this section, I present findings related to the technological skills of various faculty members who shared their recommendations for changing the focus of TEL to meaningful learning capabilities for both faculty members and students.

5.7.1 Digital literacy (Rules vs Community)

Capel's Digital Strategy Policy emphasises the importance of professional development in enhancing faculty members' digital literacy and their capacity to integrate technology into teaching practices. However, a secondary contradiction arises between the institution's *rules* promoting digital literacy and the realities faced by the faculty members' *community* (Figure 12). This tension is manifested in systemic barriers such as inadequate training, unclear roles and responsibilities for technology support, and insufficient time for skill development. Faculty members report that institutional policies set ambitious goals for TEL but fail to provide the necessary support infrastructure to achieve them. The reliance on informal learning networks and self-guided approaches further highlights this contradiction, as faculty members are left to navigate complex technologies without clear guidance or adequate resources. Additionally, the lack of collaborative structures and inconsistent support for digital tools exacerbate disparities in digital literacy across departments, leading to unequal technology adoption. These gaps not only hinder the institution's efforts to achieve its goals but also burden faculty members with the responsibility of bridging the divide independently, thereby underscoring the misalignment between institutional rules and the community's needs. Improving digital literacy through

targeted training programmes has profound implications for TEL. Such initiatives empower educators to adopt digital tools more effectively, enhancing collaboration, fostering innovative teaching practices, and ensuring equitable access to technology across all departments (Engeström, 2008; Sannino et al., 2016; Herodotou et al., 2020).

P17 underscored the lack of structured training opportunities and the resulting reliance on informal approaches:

I have not received proper training for MS Teams, and the network is glitchy. I've been on the lookout for other intervention tutors who've been using different tools, but there doesn't seem to be any groups of like-minded people to learn from. (P17)

Similarly, P5 highlighted the absence of institutionalised training programmes, leaving staff to develop digital skills independently:

A lot of staff have been here a long time, and they're not used to these systems. Technology training is still needed, but it seems like we're expected to figure it out on our own. (P5)

These perspectives emphasise a systemic disconnect between the institutional goal of fostering digital literacy and the practical implementation of training programmes. The reliance on self-guided learning creates disparities in technology adoption across departments.

The lack of clarity around roles and responsibilities further exacerbates these challenges. P14 expressed frustration with the absence of clearly defined support structures:

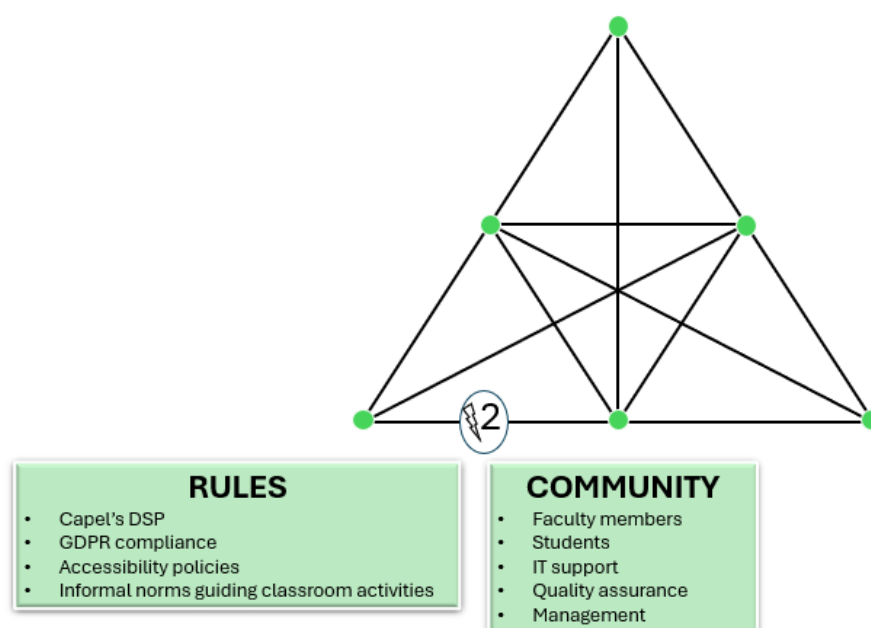
It's not clear who to approach—whether it's IT, Quality, or Digital Learning Support. This lack of clarity wastes time and leaves us unsupported. (P14)

This example shows the need for clear and accessible support systems to help educators integrate digital tools effectively into their teaching.

Time constraints also emerged as a key barrier. P6 that insufficient time allocated for professional development hinders meaningful engagement:

Technology training can't be done in an hour. We need longer sessions to really understand the tools properly and to build confidence. (P6)

Figure 12. Digital literacy



P12, as a new lecturer, acknowledged the role of informal peer mentoring but highlighted its limitations:

Seeing how others use technology inspires me to experiment, but there's no formal mechanism to learn best practices. I'm left to find my way and pick up skills ad hoc. (P12)

While informal learning networks fill some gaps, they fail to address the broader systemic contradictions. Faculty members must rely on a personal initiative to navigate the complexities of digital tools, further highlighting the disconnect between institutional policies and faculty members' needs.

P21 underscored the insufficient support for non-standard tools, leaving faculty members to find solutions independently:

If the whole community doesn't buy into using tech, it falls down quickly. We end up Googling solutions or contacting app developers because IT support doesn't cover the software we need. (P21)

These accounts illustrate tensions between the activity system's *rules* and *community* elements, where cohesive training programmes, clear guidance, or sufficient resources do not adequately support institutional expectations for digital literacy. Faculty members are left to bridge these

gaps through informal networks, trial-and-error learning, or personal initiative, which exacerbates disparities and limits the effective use of digital tools in teaching.

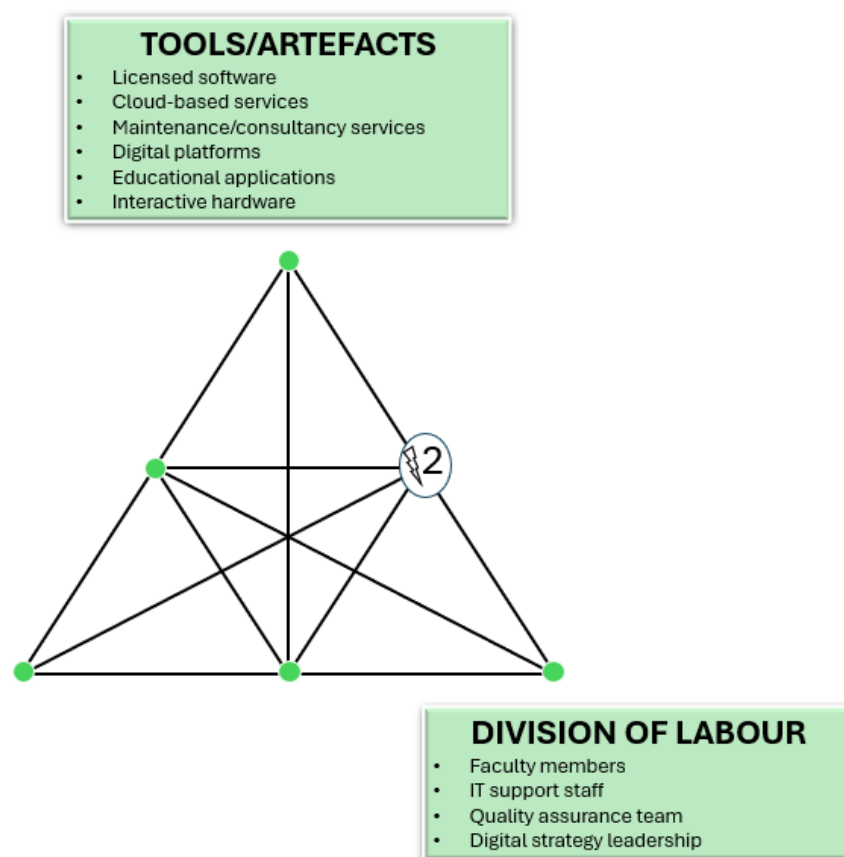
5.7.2 Institutional readiness and faculty members technology practices (Tools vs Division of labour)

This subsection examines the secondary contradictions arising from the misalignment between the digital tools provided by the institution (*tools*) and the allocation of roles and responsibilities among faculty members (*division of labour*) (Figure 13). These tensions manifest in unclear role definitions, fragmented support systems, outdated infrastructure, and insufficient training, which collectively hinder the seamless integration of technology into teaching practices. Faculty members often find themselves burdened with additional tasks that fall outside their formal responsibilities, highlighting significant systemic barriers.

One major tension involves the lack of clarity about who is responsible for managing and supporting digital tools. P14 expressed frustration with the absence of clear protocols:

I have no idea how responsibilities are distributed—whether it's IT, Quality, or Digital Learning Support. I'm sort of just trusted to create the resources and hope they'll be appropriate and effective. (P14)

Figure 13. Institutional readiness and faculty members technology practices



This lack of coordination leaves faculty members to navigate these challenges independently, often leading to inefficiencies and delays. Similarly, P5 emphasised the lack of a unified approach to technology management:

It feels like everyone is just doing their own thing when it comes to digital tools. There's no consistent approach or support structure. (P5)

Another recurring issue is the outdated infrastructure and insufficient technical support that impede the effective use of digital tools. P6 highlighted these limitations:

We've got the equipment, we've got the technology, but nobody knows how to use it, and it can't be used. (P6)

These constraints force faculty members to create workarounds, often at the expense of time and effectiveness. For instance, P16 described how they had to design simulated resources to address software limitations:

We had to design simulated spreadsheets for lessons because the required software wasn't available. It's not ideal, but we had to make do. (P16)

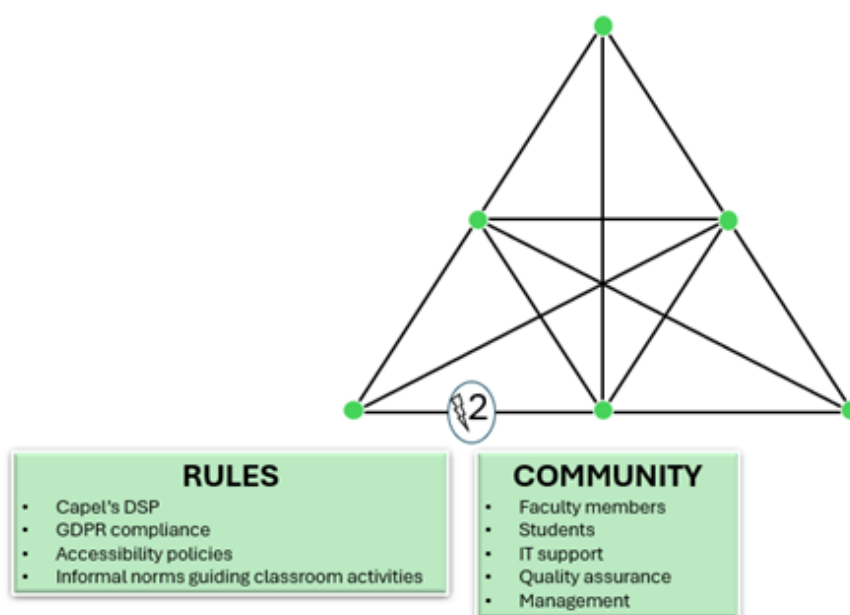
The lack of time for proper training and collaboration exacerbates these challenges. Faculty members are expected to learn new systems independently, with little institutional support. P6 shared their frustration:

There's no time built into our schedules to learn these systems properly. Training is seen as an extra, not part of our job. (P6)

The reliance on informal collaboration to bridge knowledge gaps further illustrates the strain on faculty members. P12, a new lecturer, noted:

We try to share best practices within our team, but that only works if someone already knows what they're doing. There's no formal mechanism for knowledge sharing. (P12)

Figure 14. Institutional infrastructure challenges



Unclear protocols for addressing technical issues also add to the confusion. P21 described the overburdened state of the quality team and the need for dedicated leadership:

The responsibility primarily lies with the quality team, but they are overstretched. We need someone dedicated to leading technology integration, someone who knows the industry and can steer us forward. (P21)

Faculty members sometimes resort to personal initiatives to mitigate systemic shortcomings. P11 reported relying on their own resources to ensure reliability:

I bought my own laptop because I couldn't trust the college systems. At least with my own device, I know it works and won't let me down during lessons. (P11)

This example demonstrates how gaps in institutional readiness can force educators to rely on personal resources, creating inequities and additional burdens.

These findings underscore the systemic tensions between the *tools* provided and the *division of labour* within institutions. Faculty members are often left to shoulder the burden of navigating these gaps, leading to inefficiencies, additional workloads, and missed opportunities for innovation. Addressing these barriers will require clear role definitions, improved infrastructure, and comprehensive support systems to enable faculty members to integrate digital tools seamlessly into their pedagogical practices.

5.8 Equity in technology use

After the COVID-19 pandemic, most educators and students had to move to online learning and teaching. However, despite institutional efforts outlined in Capel's Digital Strategy Policy to ensure equitable access to technology, participants highlight significant barriers, such as infrastructure limitations and financial constraints hindering effective integration efforts.

5.8.1 Institutional infrastructure challenges (Rules vs Community)

This subsection explores the secondary contradictions between institutional policies (*rules*), as articulated in Capel's Digital Strategy Policy, and the lived experiences of the educational community (*community*) (Figure 14). The Digital Strategy Policy emphasises equitable access to technology and sets ambitious goals for delivering a resilient, consistent, and inclusive digital environment. However, findings reveal significant gaps between these institutional aspirations and the practical realities faculty members face. These contradictions are particularly pronounced in areas such as outdated infrastructure, uneven resource distribution, and limited support, which hinder technology integration into teaching practices and exacerbate inequities, especially in rural or remote campuses.

The Digital Strategy Policy outlines the college's commitment to providing "*resilient and flexible*" technology infrastructure to support all campuses. Despite this, P19 highlighted disparities in resource allocation, contrasting newer, well-equipped buildings with outdated facilities:

IT have said, 'Oh, it's really tricky to get Wi-Fi into your room because we have to run a cable across from there to there.' But then that's been it. That's as far as we've gone with it. There's a lovely new building that's got all bells and whistles, and I'm in an old [anonymised location]. (P19)

Similarly, P11 noted the need to rely on personal devices due to institutional inadequacies, underscoring the inconsistency of technology access:

Sometimes you want to use a website and it's blocked. I've given up trying to rely on institutional tech and now bring my own laptop to ensure I can teach effectively. (P11)

Capel's Digital Strategy Policy emphasises equitable access to technology, including measures to address digital poverty. However, P6 reported challenges in meeting the diverse needs of students due to the lack of adequate resources:

There's no reason for anyone to fall behind if you're using a multitude of technologies in your classroom. But when the tech isn't there, it's difficult to meet all their needs equally. (P6)

These limitations affect teaching quality and impede faculty members' ability to fulfil institutional objectives. As P18 pointed out:

I feel we're expected to produce excellent lessons but not given the IT tools to do it. My suggestions for improvements have not been taken on board. (P18)

Additionally, Capel's Digital Strategy Policy's vision of a "*uniformly applied*" digital experience across campuses remains unfulfilled. P21 highlighted the critical role of community buy-in to realise the Digital Strategy Policy's goals:

If part of the community doesn't buy into using tech, it falls down quickly. Everyone has to be committed to its use. (P21)

The lack of consistent enforcement of technology-related policies compounds these challenges. P7 observed:

I know they want to strive to try and influence technology a little bit more in classes, but I'm unaware of specific policies, and they're not reinforced. (P7)

These findings illuminate the systemic tensions between Capel's digital ambitions and the lived realities of faculty members. While the Digital Strategy Policy aims to provide equitable access and promote excellence in teaching and learning, faculty members often face barriers that require personal initiatives or workarounds. Addressing these contradictions will necessitate aligning policy aspirations with actionable, consistent implementation strategies, ensuring equitable resource distribution, and fostering a culture of shared responsibility within the community.

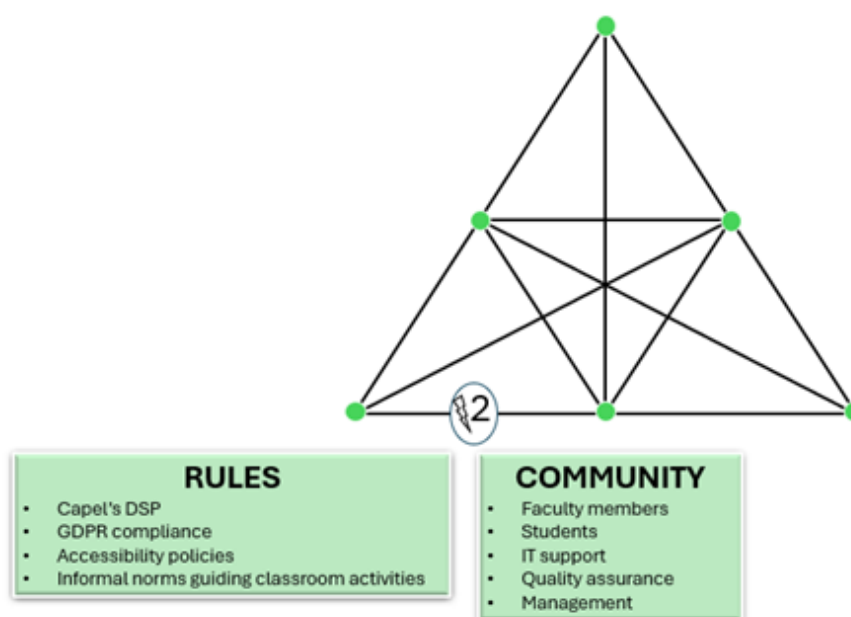
5.8.2 Equity in technology access (Rules vs Community)

This subsection examines the secondary contradictions arising between institutional policies designed to promote equitable access to technology (*rules*) and the lived realities of the educational community (*community*), particularly in rural or under-resourced campuses (Figure 15). While institutional policies, such as Capel's Digital Strategy Policy, articulate a commitment to overcoming digital poverty and ensuring consistent technological support across campuses, the findings reveal significant gaps in implementation. These tensions manifest through systemic barriers such as inadequate internet connectivity, outdated and insufficient hardware, and inequitable resource distribution. Faculty members, particularly those in remote or resource-constrained settings, frequently experience a misalignment between the stated institutional goals and the infrastructure provided, creating an environment where educators must navigate significant challenges to integrate technology effectively into their teaching. These contradictions not only hinder teaching practices but also exacerbate inequities within the broader educational community, undermining the Digital Strategy Policy's vision of inclusive and accessible technology for all stakeholders.

P19 vividly highlighted disparities in resource allocation and infrastructure challenges:

IT have said, 'Oh, it's really tricky to get Wi-Fi into your room because we have to run a cable across from there to there.' But then that's been it. That's as far as we've gone with it. There's a lovely new building that's got all bells and whistles, and I'm in an old [anonymised location]. (P19)

Figure 15. Equity in technology access



This example highlights the need for consistent infrastructure investments across campuses to ensure equitable access to technology for all faculty and students.

Similarly, P11 noted the need to rely on personal devices to navigate institutional inadequacies:

Sometimes you want to use a website and it's blocked. I've given up trying to rely on institutional tech and now bring my own laptop to ensure I can teach effectively. (P11)

This example underscores inequities in technology access that directly impact teaching practices.

P6 emphasised the challenges of meeting diverse student needs without adequate resources:

There's no reason for anyone to fall behind if you're using a multitude of technologies in your classroom. But when the tech isn't there, it's difficult to meet all their needs equally. (P6)

Despite institutional efforts outlined in Capel's Digital Strategy Policy, which emphasises equitable technology access, participants described systemic shortfalls. For instance, P18 expressed frustration with unmet faculty members' needs:

I feel we're expected to produce excellent lessons but not given the IT tools to do it. My suggestions for improvements have not been taken on board. (P18)

Capel's Digital Strategy Policy also commits to addressing digital poverty, but faculty members shared experiences of significant gaps in its implementation. P7 observed a lack of consistent policy reinforcement:

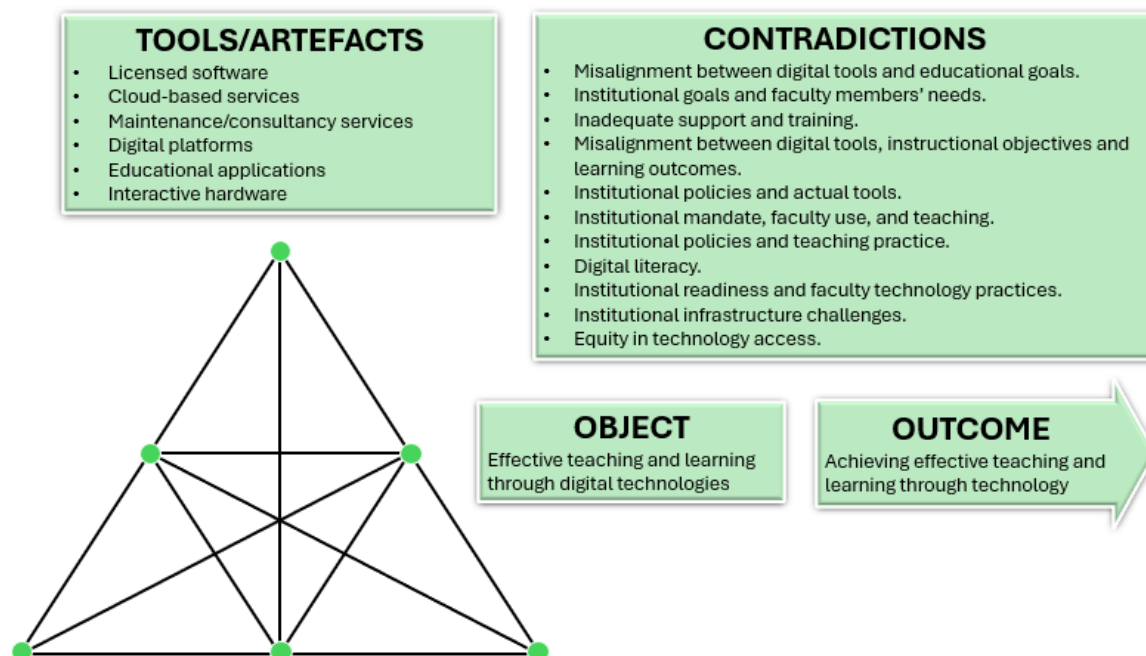
I know they want to strive to try and influence technology a little bit more in classes, but I'm unaware of specific policies, and they're not reinforced. (P7)

Furthermore, P21 emphasised the critical role of collective commitment in realising equitable access:

If part of the community doesn't buy into using tech, it falls down quickly. Everyone has to be committed to its use. (P21)

These findings illustrate the persistent tension between policy goals and on-the-ground realities. Faculty members frequently resort to workarounds or personal initiatives to bridge gaps in technology access, reflecting a disconnect between institutional aspirations and the lived experiences of educators. Addressing these contradictions will require aligning resource distribution with institutional priorities, fostering community-wide commitment to technology use, and ensuring consistent policy enforcement to meet the needs of all stakeholders.

Figure 16. Activity system model: contradictions revealed



5.9 Conclusion

The findings presented in this section reveal significant systemic barriers and contradictions within the activity system of digital technology use in a UK land-based educational institution (Figure 16). These tensions, rooted in the interplay between the various elements of the activity system, hinder the effective integration of digital tools into teaching practices and impact the ability of faculty members to achieve desired educational outcomes.

A key contradiction identified was the misalignment between *tools* and the *object*, where digital resources often failed to support the specific instructional objectives of faculty members. For example, the lack of access to suitable software, inadequate infrastructure, and outdated technology were recurring issues that disrupted lesson delivery and limited hands-on learning opportunities.

Another critical tension was observed in the relationship between *rules* and *community*, where institutional policies advocating equitable technology access and consistent use were inconsistently enforced. Faculty members highlighted systemic challenges such as the uneven distribution of resources, limited connectivity in rural campuses, and restricted access to essential online tools due to firewalls and outdated practices. These challenges underline broader

issues in institutional strategies, where policies designed for equitable access often fail to account for regional disparities and infrastructure limitations. This disconnect suggests a need for more adaptive and context-sensitive implementation approaches to bridge the gap between institutional aspirations and on-the-ground realities. These contradictions exacerbated inequities and created additional workloads for educators.

Within the dimension of the *division of labour* and its interaction with the *community*, unclear role definitions and fragmented support systems further compounded these challenges. Faculty members frequently expressed frustration with the absence of coordinated institutional support for managing and utilising digital tools, leaving them to rely on informal peer networks or individual initiatives to address gaps.

The findings also underscored contradictions between the *object* and *outcome*, where the intended learning objectives were often undermined by systemic barriers. Faculty members reported inefficiencies arising from misaligning tools with expected outcomes, such as student engagement and skill development. In some cases, institutional mandates failed to account for the realities of teaching contexts, further disrupting the achievement of desired outcomes.

Lastly, the interaction between the *community* and the *rules* governing technology use revealed a lack of collective commitment and buy-in. Faculty members often navigated these contradictions independently, highlighting a systemic disconnect between institutional aspirations and the practical realities educators face.

Table 1 and Table 2 summarise, respectively, the contradictions, themes and sub-themes identified in this study. Overall, these findings illuminate the barriers and contradictions embedded in the activity system that faculty members must navigate in their efforts to integrate digital tools effectively. These systemic tensions span across the elements of tools, rules, community, division of labour, object, and outcome, pointing to the complexity of achieving successful digital technology integration in UK land-based educational institutions.

Table 1. Contradictions identified

Contradictions identified	
Misalignment between digital tools and educational goals (Tools/Artefacts)	• Tools not meeting pedagogical needs. • Inequity in infrastructure and hardware distribution.
Institutional goals and faculty members' needs (Rules vs Object)	• Resource constraints and policy gaps. • Conflicting institutional priorities.
Inadequate support and training (Division of Labour vs Community)	• Insufficient structured guidance. • Reliance on informal peer mentoring.
Misalignment of digital tools, instructional objectives, and learning outcomes (Tools vs Object vs Outcome)	• Gaps in student proficiency with essential tools. • Context-specific tool limitations.
Institutional policies and actual tools (Rules vs Tools)	• Blanket policies ignoring diverse needs. • Restrictions such as firewalls limiting access.
Institutional mandate, faculty use, and teaching (Rules vs Object vs Outcome)	• Policy misalignments with practical realities. • Delays and inefficiencies in implementing new tools.
Institutional policies and teaching practice (Rules vs Object)	• Unclear expectations. • Challenges adapting resources to policy priorities.
Digital literacy (Rules vs Community)	• Insufficient training and unclear support structures. • Heavy reliance on self-guided learning.
Institutional readiness and faculty technology practices (Tools vs Division of Labour)	• Outdated infrastructure. • Unclear role allocation and fragmented support systems.
Institutional infrastructure challenges (Rules vs Community)	• Inequities in resource distribution across campuses. • Barriers to achieving consistent technology access.
Equity in technology access (Rules vs Community)	• Infrastructure limitations. • Persistent digital divides.

6. Discussion

The discussion builds on the findings presented in the preceding section, which identified critical contradictions and barriers in digital technology adoption among faculty members at United Kingdom (UK) land-based educational institutions. The primary research question guiding this study is: “*How are digital strategies at UK land-based educational institutions impacted by contradictions of faculty members’ social practices?*” The findings not only answer the research questions by shedding light on technology-use practices among faculty members but also have implications for addressing key gaps in the existing literature.

Table 2. Themes and sub-themes identified

Themes identified	Sub-themes identified
Alignment of Digital Tools with Educational Goals	• Misalignment between institutional provisions and pedagogical needs. • Barriers such as outdated resources and lack of infrastructure.
Institutional Policies and Implementation Practices	• Challenges in aligning policies with faculty requirements. • Inadequacies in resource allocation and technology support.
Digital Literacy and Professional Development	• Need for ongoing, structured training programmes. • Role of informal networks in filling training gaps.
Equity in Technology Use	• Disparities in access to resources. • The necessity for consistent implementation of equitable strategies.

First, the study emphasises the importance of understanding the socio-cultural dynamics influencing the practices of technology use among faculty members. While previous literature has touched on challenges related to technology integration (Price et al., 2005; Kirkwood & Price, 2014; Bayne, 2015; Passey, 2019; Chan, 2021), this study applies Engeström's (1987) CHAT to analyse the systemic contradictions that underpin these dynamics. By situating these practices within the CHAT framework, the findings highlight how elements such as institutional policies, infrastructure limitations, and community expectations shape faculty members' engagement with digital tools.

Second, the findings underscore the need for targeted professional development programmes that address specific technological competencies relevant to land-based education. This aligns with prior research advocating tailored interventions to enhance faculty members digital literacy and pedagogical skills (Hafifah & Sulisty, 2020; Krašna & Pesek, 2020; Khomik et al., 2021; Dezelak et al., 2022). Beyond improving technical proficiency, this study emphasises the importance of designing these programmes to align with faculty's professional roles and the socio-cultural contexts of land-based education.

Furthermore, this section explores actionable strategies to resolve contradictions identified in the findings section. For instance, addressing infrastructure limitations—such as poor Wi-Fi connectivity and outdated equipment—is critical for ensuring equitable technology access. Similarly, the ambiguity surrounding digital support roles calls for a clearer delineation of responsibilities within the division of labour. A more cohesive approach to system integration is essential

to tackle fragmented digital systems, fostering collaboration and reducing inefficiencies. Finally, addressing restrictive institutional policies requires re-evaluating existing rules to create a more flexible digital learning environment. These strategies align with findings from Backfisch et al. (2021), who highlight variability in technology integration based on infrastructure and faculty utility, and El-Sabagh (2021), who emphasises adaptive environments for improving engagement. Additionally, Quezada-Morales (2022) underscores the importance of institutional adaptability in the face of technological challenges.

These recommendations contribute to a growing body of literature on the interplay between digital strategies and faculty practices (Raes et al., 2020; Backfisch et al., 2021; El-Sabagh, 2021; Blikstad-Balas et al., 2022; Quezada-Morales, 2022). By applying CHAT to these findings, this research expands its application in understanding technology integration and highlights pathways for addressing systemic barriers to equitable digital transformation in UK land-based educational institutions.

Resolving contradictions, such as improving infrastructure or aligning tools with faculty needs, directly enhances TEL by creating seamless integration pathways for digital tools. These improvements reduce faculty resistance, encourage innovation, and ensure students experience engaging and accessible learning environments (Engeström, 2008; Bligh & Flood, 2017; Herodotou et al., 2020). Addressing these systemic barriers also fosters collaboration among faculty and institutional stakeholders, laying the foundation for adaptive TEL ecosystems that meet diverse pedagogical needs (Sannino et al., 2016; Backfisch et al., 2021).

6.1 How does Cultural Historical Activity Theory illuminate contradictions in technology-use among faculty members at a UK land-based institutions?

CHAT provides a robust framework for understanding the dynamic interplay of tools, rules, and social structures in faculty technology practices. This study uncovers contradictions that hinder effective digital technology adoption, aligning with the tensions described in Price et al. (2005), Kirkwood and Price (2014), Bayne (2015), Passey (2019), and Chan (2021). By examining these contradictions, the research sheds light on systemic issues that obstruct the seamless integration of technology into teaching practices, thereby offering a comprehensive analysis of barriers to digital transformation in UK land-based institutions.

CHAT's ability to identify systemic contradictions within activity systems aligns closely with the goals of TEL frameworks. For example, TEL strategies such as Blended Learning (Graham, 2018) and Adaptive E-learning (El-Sabagh, 2021) aim to enhance faculty and student engagement by addressing barriers to technology adoption. CHAT complements these frameworks by offering a structured methodology for analysing and resolving tensions within TEL systems, such as misaligned tools, inadequate support structures, and institutional policy gaps (Sannino et al., 2016; Bligh & Flood, 2017). This synergy enables TEL frameworks to benefit from CHAT's systemic insights, fostering more effective technology integration and improved learning outcomes.

6.1.1 Misalignment between digital tools and educational goals

CHAT helps understand secondary contradictions within the activity system, specifically the misalignment between the digital tools (*tools/mediating artefacts*) and the educational goals (*object*) they are intended to support. The misalignment between tools and instructional goals undermines the ability of students to connect theoretical learning with practical applications, a cornerstone of land-based education. For instance, digital tools designed for general classroom settings often fail to accommodate the specific needs of outdoor and hands-on learning environments, such as unreliable internet connectivity in rural areas or the lack of portable, durable hardware. These challenges diminish student engagement and limit opportunities for experiential learning, ultimately reducing the efficacy of TEL practices in these contexts (Graham, 2018; Backfisch et al., 2021). Addressing this misalignment requires selecting and adapting tools that support the unique requirements of land-based education, enabling faculty members to deliver more contextually relevant and impactful lessons. Furthermore,

poor Wi-Fi connectivity in outdoor classrooms exacerbated this misalignment, creating barriers to technology use in these contexts. These findings reflect the broader challenges outlined by Leithwood et al. (1999), Kundu et al. (2020), and Maheshwari (2021), who emphasise the necessity of aligning digital tools with specific instructional objectives. Backfisch et al. (2021) further highlight the variability of tool utility in shaping effective integration, while Bayne (2015) and Önalán and Kurt (2020) critique the suitability of certain digital tools for diverse educational settings, including those requiring practical applications.

6.1.2 Institutional goals and faculty members' needs

A secondary contradiction arises from the tension between institutional goals (*rules*) and faculty members' needs (*object*). Institutions often focus on broad digital strategies, such as maintaining licensed software and cloud-based platforms, without addressing educators' immediate, practical requirements—for example, access to exam preparation materials. This disconnect creates friction within the activity system, as faculty members feel unsupported in their teaching roles. Önalán and Kurt (2020) highlight the necessity of considering educators' practical needs when designing institutional policies to ensure alignment with teaching realities. Quezada-Morales (2022) underscores the importance of institutional adaptability to meet diverse teaching needs, while Maheshwari (2021) emphasises aligning institutional strategies with educators' practical demands to bridge these gaps.

6.1.3 Inadequate support and training

Inadequate training and support further exacerbate barriers to TEL integration. Faculty members often report being underprepared to leverage digital tools effectively, leading to fragmented adoption and inconsistent practices. Enhanced support systems, including structured professional development and real-time technical assistance, are critical for building faculty confidence and competency in TEL practices (El-Sabagh, 2021; Khomik et al., 2021). For instance, targeted training on using platforms like Moodle or Share-Point for blended learning can help faculty design lessons that bridge the gap between digital tools and instructional objectives. This improves technology integration and fosters a culture of collaboration and innovation among educators. Faculty members often rely on trial-and-error methods due to insufficient professional development tailored to their needs. For example, despite the availability of tools like Microsoft Teams, many educators lack structured guidance on integrating these tools into their pedagogical practices effectively, leading to frustration and inefficiency. This gap

is particularly concerning given the increasing reliance on digital tools for both in-class and remote learning. El-Sabagh (2021) and Khomik et al. (2021) underscore the critical role of targeted professional development in building digital competencies and fostering confidence among educators to experiment with and adopt new technologies. Additionally, Passey (2019) emphasises the importance of designing training programmes that are context-sensitive and iterative, allowing faculty members to develop their skills progressively while addressing specific challenges within their teaching environments. Structured training initiatives must prioritise alignment with the unique demands of land-based education, where practical, hands-on applications often require innovative digital solutions tailored to real-world contexts.

6.1.4 Misalignment between digital tools, instructional objectives and learning outcomes

The findings also reveal a misalignment between digital *tools*, instructional *objectives*, and learning *outcomes*, creating another secondary contradiction within the activity system. For example, students struggled to use Microsoft Excel in practical applications, which limited their ability to connect theoretical concepts with real-world tasks. This misalignment leads to disengagement, as noted by Bayne (2015) and Chan (2021), who emphasise the importance of aligning technology with instructional goals to enhance student engagement and outcomes. Addressing this issue requires selecting and adapting tools that better suit land-based education's hands-on, practical nature.

6.1.5 Conclusion

The contradictions within UK land-based institutions' digital strategies reveal a complex network of systemic misalignments that hinder effective technology integration. These include mismatches between tools and educational goals, institutional strategies and faculty needs, inadequate support structures, and tools and learning outcomes. These contradictions disrupt the activity system by creating tensions between the elements of *tools*, *rules*, *community*, and *objects*. Addressing these systemic issues requires adopting CHAT-informed approaches that emphasise collaborative resolution of these tensions. This involves aligning digital tools more closely with the socio-cultural and practical demands of faculty members and students while ensuring that institutional strategies are flexible and responsive to the unique challenges of land-based education.

6.2 How do existing digital strategies align or conflict with faculty members' technology practices and challenges?

CHAT reveals systemic contradictions in aligning institutional digital strategies with faculty practices, highlighting the gaps between institutional aspirations and the day-to-day realities of educators. While institutions aim to create robust digital environments, the findings section indicates persistent issues such as outdated equipment, inadequate infrastructure, and restrictive policies that impede effective technology use. These contradictions, framed through CHAT, illustrate how misaligned tools and policies disrupt faculty practices and hinder the potential of digital technologies to enhance learning outcomes. Addressing these systemic tensions requires a focus on integrating institutional strategies with the practical needs of faculty members, ensuring that technological resources are both accessible and contextually relevant.

6.2.1 Institutional policies and actual tools

One major contradiction lies between institutional policies (*rules*) and the *tools* provided to faculty members. While policies emphasise a resilient digital infrastructure, faculty members report outdated equipment, unreliable tools, and access restrictions, such as blocked websites, that hinder effective teaching practices. For instance, institutions invest heavily in cloud-based systems yet fail to address practical concerns such as hardware availability and connectivity issues in outdoor environments. These gaps mirror findings by Correani et al. (2020) and Falloon (2020), who highlight the disconnect between institutional aspirations and on-the-ground realities. Moreover, Leithwood et al. (1999) stress the importance of institutional leadership in ensuring tools meet the practical needs of educators, while Önalán and Kurt (2020) emphasise adapting policies to accommodate diverse teaching contexts.

6.2.2 Institutional mandate, faculty members' use and teaching

A secondary contradiction arises between institutional mandates (*rules*), faculty members' technology use (*object*), and teaching outcomes (*outcome*). Institutions often establish mandates emphasising standardised use of digital platforms, such as SharePoint or Moodle, but fail to recognise faculty members' limitations when these tools do not align with teaching demands. For example, limited access to practical resources and unreliable Wi-Fi inhibit effective technology use in outdoor and experiential learning contexts. Limani et al. (2019) and Webster and Gardner (2019)

argue that institutional readiness, coupled with resource availability, is key to the success of digital strategies. The findings section illustrates how faculty are often compelled to rely on personal devices and workarounds, creating inefficiencies and frustrations. These findings align with Kundu et al. (2020) and Maheshwari (2021), who stress the need for policies that bridge the gap between institutional mandates and the realities of teaching.

6.2.3 Institutional policies and teaching practice

Another central contradiction stems from the disconnect between institutional policies (*rules*) and their execution in teaching practices (*object*). While institutions often design comprehensive digital strategies, these policies frequently overlook the specific needs of teaching contexts. For example, policies promoting broad tool adoption do not account for the incompatibility of these tools with practical, hands-on learning. Faculty members noted that tools such as Microsoft Excel, which require substantial prior knowledge, create barriers for students and misalign with the curriculum. Kundu et al. (2020) emphasise the importance of aligning policies with practical applications, while Maheshwari (2021) highlights how institutional culture shapes technology adoption. Quezada-Morales (2022) further underscores the need for flexible and context-sensitive policies to support diverse teaching practices effectively.

The findings highlight the need for policies involving faculty members in their design and implementation. Advisory committees composed of faculty representatives can guide institutional efforts by providing insights into practical challenges, such as tool compatibility with specific teaching scenarios. Such participatory governance ensures that digital strategies are theoretically sound and practically effective (Hirsh & Segolsson, 2019; Maheshwari, 2021).

6.2.4 Conclusion

The findings demonstrate that existing digital strategies at UK land-based institutions frequently conflict with faculty members' technology practices due to systemic contradictions within the activity system. Misalignments between institutional policies, digital tools, and teaching practices create significant barriers to effective technology use. To resolve these contradictions, institutions must adopt a CHAT-informed approach that considers faculty and students' socio-cultural and practical realities. This includes redesigning policies to prioritise adaptability, providing tools that align with educational objectives, and ensuring consistent support and training to bridge the gap between institutional aspirations and teaching realities.

6.3 What technology-related challenges do faculty members face, and how do these impact resource sharing and communication?

CHAT highlights systemic contradictions in the technological challenges faculty members face at UK land-based institutions. These challenges include limited digital literacy, gaps in institutional readiness, insufficient professional development, and inequitable access to technology. These contradictions affect faculty members' ability to share resources effectively and their capacity to build collaborative teaching environments and enhance learning outcomes. The findings section reveals that fragmented digital systems, inadequate infrastructure, and inconsistencies in policy implementation compound these challenges. Addressing these systemic issues necessitates a comprehensive approach that integrates tailored digital strategies, context-sensitive training, and equitable resource distribution to resolve tensions within the activity system and foster a more collaborative and supportive digital environment.

6.3.1 Digital literacy

The findings indicate a persistent secondary contradiction between institutional policies (*rules*) emphasising digital literacy and the practical realities (*community*) faced by faculty members. While policies advocate for robust digital literacy training, faculty members often lack adequate support, leading to frustration and inefficiencies in technology use. This tension is exacerbated by limited guidance on tools like SharePoint and Moodle, as highlighted in the preceding section on findings. Eshet-Alkalai (2004), Correani et al. (2020), Krašna and Pesek (2020), Khomik et al. (2021), and Dezelak et al. (2022) emphasise that digital literacy is a foundational competency necessary to bridge the gap between institutional expectations and practical teaching needs. Passey (2019) further underscores that effective digital literacy training must be iterative, context-sensitive, and aligned with faculty feedback to ensure accessibility and practicality in land-based education environments.

6.3.2 Institutional readiness and faculty members' technology practices

A secondary contradiction exists between institutional readiness (*tools*) and faculty members' practical technology practices (*division of labour*). Institutions may implement digital strategies, but gaps in infrastructure and support hinder faculty members' ability to meet teaching objectives. The preceding section on findings highlights faculty reliance on personal devices or unsupported tools due to inadequate institutional resources, which disrupts their workflow and

collaboration efforts. This tension also reflects a misalignment between the tools provided (*tools/mediating artefacts*) and the roles and responsibilities expected from faculty members (*division of labour*). Limani et al. (2019) and Webster and Gardner (2019) emphasise that institutional readiness, including sufficient infrastructure and clear communication, is critical for effective digital strategy implementation. Moreover, Correani et al. (2020) argue that a lack of cohesion between institutional readiness and practical requirements undermines the potential benefits of digital strategies. Herodotou et al. (2020) further stress that aligning digital strategies with faculty needs requires greater investment in resources, better infrastructure, and flexibility in system design to address these practical teaching demands. Addressing this contradiction requires institutions to prioritise context-specific solutions that bridge the gap between readiness and practical utility.

6.3.3 Professional development programmes and ongoing support

The findings identify a significant gap between the emphasis on professional development in institutional policies and the lack of ongoing support for faculty members. Many faculty members report that while initial training is provided, there is insufficient follow-up to address emerging challenges. The findings highlight the need for sustained, adaptive professional development programmes that effectively support faculty in integrating new technologies. Graham (2018), Heo and Han (2021), and Ismail et al. (2021) stress the importance of structured professional development initiatives that include continuous support and practical applications. Kumar et al. (2021) further recommend that institutions develop iterative programmes and incorporate feedback from faculty to address evolving needs.

6.3.4 Equity in technology access

Equity in technology access represents another critical secondary contradiction, specifically between institutional policies (*rules*) aimed at promoting equitable access and the *community* (faculty members and students) who face practical barriers to accessing technology. These barriers include infrastructural and resource limitations, such as unreliable internet, outdated devices, and insufficient information technology support. The findings revealed significant challenges in underserved areas, where faculty members struggle with unreliable internet, outdated or insufficient devices, and limited access to information technology support. This creates tension within the activity system, as the tools provided (*tools/mediating artefacts*) fail to align with the needs of the *community* (faculty members

and students), and the institutional policies (*rules*) aimed at inclusivity and collaboration remain inadequately implemented. This misalignment compounds the barriers faced by underserved groups, further entrenching inequities and limiting the effectiveness of resource-sharing and collaborative practices. This contradiction extends beyond individual faculty experiences, impeding collective teaching practices and institutional objectives for equitable digital integration.

Research by Kundu et al. (2020) and Quezada-Morales (2022) highlights the importance of targeted investments to ensure equitable access to technology, emphasising the need to prioritise underserved areas. Limani et al. (2019) and Correani et al. (2020) argue that addressing equity issues requires a combination of financial investment and strategic planning, ensuring resources are allocated to areas with the greatest need. For example, the findings revealed significant disparities in access to infrastructure, such as unreliable internet in rural areas and a lack of modern devices for faculty members and students in underserved regions. These gaps underscore the necessity of strategic resource allocation to enhance both technological equity and institutional inclusivity. This includes infrastructure upgrades, better connectivity, and procurement of essential tools such as laptops and smart classroom technologies. Moreover, faculty members emphasised the need for localised solutions, such as mobile technology hubs or community information technology support services, to bridge the equity gap effectively. Institutions must implement policies that go beyond funding allocation to include the development of flexible strategies tailored to specific regional challenges, ensuring all faculty members have access to the tools necessary for effective resource sharing and collaborative practices.

6.3.5 Conclusion

The contradictions within the activity system highlight the systemic challenges faculty members face in resource sharing and communication due to digital literacy gaps, institutional readiness issues, inadequate professional development, and inequitable technology access. Addressing these challenges requires a CHAT-informed approach that resolves tensions between *rules*, *tools*, and *community* elements. To address equity issues, institutions must allocate resources strategically to underserved campuses, prioritising investments in infrastructure and devices for rural and low-resource areas (Kundu et al., 2020; Quezada-Morales, 2022). Initiatives such as subsidising personal devices for educators, establishing mobile technology hubs, and enhancing connectivity in remote campuses are critical for bridging digital divides and fostering inclusivity (Correani et al., 2020). By prioritising targeted professional development,

equitable resource allocation, and practical digital literacy programmes, institutions can foster a supportive environment that enhances faculty members' ability to effectively integrate technology into their teaching practices, ultimately improving resource sharing, communication, and educational outcomes.

6.4 Comparative perspectives on digital strategy contradictions

In examining contradictions in digital technology use, parallels can be drawn with findings from other sectors and regions. For instance, the financial services sector has recognised that rapid technology adoption can introduce systemic risks, prompting the development of comprehensive risk management frameworks to mitigate these issues (Financial services study reveals emerging tech-driven systemic risks, 2021). Such frameworks emphasise the importance of integrating iterative feedback loops and co-design strategies to address systemic tensions effectively.

Similarly, public sector initiatives, such as implementing digital platforms like OneStop in United States building departments, illustrate digital transformations' benefits and unintended consequences (Kim et al., 2024). While these platforms have standardised processes, they have also exacerbated inequities due to reduced face-to-face interactions, underscoring the importance of equitable user engagement in digital transitions (Kim et al., 2024).

The 'adverse digital incorporation' concept from global contexts further highlights how inequitable digital transformations can perpetuate systemic inequalities. Heeks (2021) argues that inclusion in digital systems must be designed to avoid disproportionate value extraction by advantaged groups, a principle equally relevant to addressing contradictions in UK land-based education. These comparative insights suggest that participatory design, equity-driven policies, and adaptive strategies are universally applicable in mitigating systemic contradictions in digital strategies.

7. Conclusion

This study addressed the challenges of effective digital strategy implementation in United Kingdom (UK) land-based colleges, using Capel Manor College (Capel) as a focused case study. The researcher's experience, witnessing the challenges faced by educational institutions without a clearly communicated digital strategy, further underscored the significance of this research. As a business and digital skills lecturer at a land-based further education college, the

researcher experienced firsthand the implications of operating without a coherent digital strategy and direction. Rooted in Engeström's Cultural Historical Activity Theory (CHAT), the research examined systemic contradictions within faculty members' social practices and their influence on digital strategy alignment. The study uncovered critical tensions between institutional policies, digital tools, and teaching practices by leveraging CHAT's comprehensive framework. These insights revealed systemic barriers, such as misaligned tools and inequities in resource allocation, that hinder effective technology integration in land-based education.

The primary research question guiding this investigation was: *How are digital strategies at UK land-based educational institutions impacted by contradictions in faculty members' social practices?* This overarching question was addressed through thematic discussions of the findings, illuminating the systemic misalignments, challenges, and opportunities associated with digital technology use in land-based educational settings.

The first research sub-question, *"How does Cultural Historical Activity Theory illuminate contradictions in technology use among faculty members at a UK land-based institutions?"* was explored by identifying key contradictions, such as the misalignment between digital tools and educational goals. These contradictions were shown to impact faculty members' ability to integrate technology effectively into their teaching practices, highlighting systemic barriers within the activity system. The second sub-question, *"How do existing digital strategies align or conflict with faculty members' technology practices and challenges?"* was answered by uncovering primary and secondary contradictions, such as inequities in resource distribution and inconsistencies in institutional policies, that significantly hinder effective strategy implementation. Lastly, the third sub-question, *"What technology-related challenges do faculty members face, and how do these impact resource sharing and communication?"* was addressed by analysing issues related to digital literacy, institutional readiness, professional development, and equity in technology access. These interconnected challenges provide a nuanced understanding of the systemic factors influencing digital strategy outcomes, directly contributing to the study's core argument.

7.1 Implications

The findings hold significant implications for both policy and practice in UK land-based educational institutions. Institutions must address disparities in resource allocation, particularly in rural campuses where infrastructure and tool availability are inconsistent. Ensuring equitable access to

technology, such as robust Wi-Fi connectivity and updated devices, is essential to creating inclusive teaching environments that meet the diverse needs of students and faculty members. To achieve this, policies must prioritise such equity in technology access, focusing on addressing systemic gaps that currently hinder consistency across different campuses.

Technology investments must prioritise adaptive tools and platforms that align with instructional goals and diverse teaching contexts. For instance, developing tools that function reliably in low-connectivity environments can address outdoor learning challenges in rural settings. Additionally, institutions should involve faculty members in procurement decisions to ensure the tools selected meet their pedagogical requirements. This participatory approach can reduce resistance and enhance the practical utility of digital tools in achieving educational outcomes.

Faculty involvement in policy design emerges as another critical factor. By incorporating bottom-up input, institutions can align digital strategies more closely with on-the-ground teaching needs and practical realities. Institutions must address systemic contradictions by adopting flexible and context-sensitive digital strategies that align institutional goals with the practical needs of educators. For instance, providing faculty members the autonomy to customise tools for specific instructional objectives can mitigate the misalignment between digital tools and pedagogical goals. Policies should also prioritise equitable resource distribution by addressing disparities across campuses. Investments in infrastructure, such as reliable Wi-Fi and portable devices, are essential for enabling faculty and students in rural or under-resourced settings to access critical tools and technologies. As primary users of digital tools, faculty members provide valuable insights into the challenges and opportunities of technology integration, making their involvement indispensable for effective policy-making.

On the practical side, tailored professional development is imperative. Continuous training programmes should address the specific technological competencies required for land-based education, including using hands-on learning tools and adaptive teaching technologies. These programmes must go beyond one-off training sessions, instead providing iterative and context-sensitive support that enables faculty members to adapt to evolving digital demands effectively.

Faculty support is another critical factor in successfully integrating technology-enhanced learning (TEL). Structured professional development initiatives, combined with ongoing technical support, empower educators to use digital tools effectively, reducing resistance and fostering a collaborative

culture of innovation. Institutions must prioritise creating support systems that holistically address faculty members' needs, recognising their role as the primary drivers of TEL success in educational settings.

Institutional policies should prioritise structured, iterative professional development programmes designed to address specific challenges unique to land-based education. For example, training faculty members in using mobile applications for outdoor learning or incorporating interactive digital tools like augmented reality can enhance instructional effectiveness. Furthermore, incorporating feedback mechanisms into these programmes ensures continuous improvement and alignment with faculty needs. Sustained professional development initiatives, paired with follow-up support, can foster a culture of innovation and collaboration among educators.

Moreover, the alignment of digital tools with educational goals is crucial. Institutions should focus on deploying technologies that support practical, hands-on learning objectives, addressing the unique requirements of land-based curricula. Misaligned tools hinder teaching practices and exacerbate existing systemic contradictions, making it imperative for institutions to adopt a strategic and goal-oriented approach to tool selection and deployment. This study highlights the critical role of resolving systemic contradictions in advancing TEL. By aligning institutional strategies with faculty practices, these changes can lead to enhanced student engagement, improved technology adoption, and more inclusive online learning environments. Such advancements underscore the transformative potential of TEL in addressing diverse educational needs, as supported by collaborative frameworks like expansive learning and CHAT. Resolving systemic tensions also equips institutions to create adaptive TEL ecosystems, fostering sustained innovation and inclusivity.

These findings resonate with challenges and strategies observed globally across various sectors. Institutions in other fields have addressed similar contradictions through iterative policy development, participatory governance, and user-centred design, ensuring that digital strategies align with practical needs and equity considerations. By adapting these lessons, educational institutions can resolve systemic tensions and create resilient frameworks for ongoing digital transformation.

Resolving systemic contradictions within activity systems enhances institutional strategies and strengthens TEL frameworks. TEL strategies, such as Adaptive E-learning and Blended Learning, benefit from CHAT's systemic analysis by identifying and addressing barriers like misaligned policies

or inadequate training. This integration fosters smoother technology adoption, increases student engagement, and creates inclusive learning environments. By aligning TEL practices with CHAT insights, institutions can develop adaptive digital ecosystems that support sustained innovation and inclusivity.

7.2 Limitations

While this study offered valuable insights, several limitations must be acknowledged to contextualise its findings. The research focused exclusively on a single multi-site UK land-based institution, which limits the generalisability of its conclusions to other contexts. However, this targeted approach provided a detailed and nuanced exploration of systemic tensions unique to the specific environment of Capel. The narrow focus enabled in-depth insights but also suggests that further comparative research across multiple institutions would be valuable for broader applicability.

Another limitation lies in the theoretical framework employed. CHAT's macro-level emphasis proved invaluable for analysing systemic contradictions but occasionally obscured faculty members' more nuanced micro-level interactions and individual agency. This challenge aligns with critiques of CHAT that emphasise its complexity and resource-intensive nature, particularly when applied to dynamic and multi-faceted educational contexts. The need to prioritise certain activity system elements during data collection further underscores the practical challenges of employing such a comprehensive framework.

The diversity of participants also presented a constraint. While the study included representatives from various occupational areas within the institution, the sample size was relatively limited. A broader participant base would allow for a more inclusive understanding of faculty experiences and potentially uncover additional systemic contradictions. Future studies could address this limitation by incorporating perspectives from a wider range of educators and stakeholders, thereby enhancing the robustness and applicability of the findings.

These limitations, while notable, do not diminish the value of the insights gained. Instead, they highlight opportunities for future research to build upon and expand the study's contributions to the field of digital strategy implementation in UK land-based educational institutions.

7.3 Future research

Building on the findings and limitations of this study, several lucrative avenues for future research emerge that can extend and deepen our understanding of digital strategy implementation in land-based educational institutions. One potential direction involves conducting comparative studies across multiple land-based institutions to explore systemic contradictions and identify shared challenges and context-specific differences. Such studies could offer a broader perspective on the variability of institutional practices and their impact on faculty and student engagement with technology.

Longitudinal research presents another valuable opportunity, allowing researchers to elucidate changes in faculty technology practices and the evolution of institutional strategies over time. By closely examining these dynamics over extended periods, future studies could provide insights into the sustainability of digital transformation efforts and identify the factors that underpin long-term success or failure in implementing digital strategies. Such research would offer a deeper understanding of how systemic and contextual variables influence the adaptation and integration of digital tools in educational settings, thereby contributing to more effective and resilient strategy development.

Future research could explore the long-term impacts of resolving systemic contradictions on TEL outcomes, such as student satisfaction, technology adoption rates among educators, and the scalability of innovative TEL practices across institutions. Additionally, longitudinal studies could investigate how sustained improvements in infrastructure and training influence TEL ecosystems over time. Integrating frameworks like CHAT with micro-level approaches, such as Interaction Analysis, could provide deeper insights into individual and collaborative technology use in educational settings.

Another promising avenue for future research is the implementation of a Change Laboratory intervention. This methodology engages policymakers, faculty members, students, and administrators in a deeply collaborative process centred on the activity system model. Participants work through a systematic series of stages, beginning with identifying and labelling the key elements of the activity system model to pinpoint contradictions within and between these elements. Once these systemic tensions are understood, stakeholders collaboratively design an improved activity system model that addresses the identified issues. The process continues with the practical implementation, iterative testing, and eventual consolidation of the new

activity system model across educational practices. A Change Laboratory intervention provides actionable solutions to systemic contradictions and fosters a shared understanding among stakeholders. This participatory approach enhances collective ownership of outcomes and generates valuable insights into the dynamics of collaborative problem-solving and the development of sustainable, effective digital strategies in education.

Finally, integrating CHAT with complementary frameworks that capture micro-level dynamics, such as Interaction Analysis, could enhance the analytical depth of future research. Interaction Analysis is a systematic research technique designed to unitise and code sequential, naturally occurring interaction behaviours reliably. This approach allows researchers to make valid interpretations and inferences within the context of the observed interactions, offering a detailed examination of how such behaviours unfold in specific settings. While CHAT provides a robust systemic perspective, focusing on broader activity systems and contradictions, Interaction Analysis can offer a complementary lens by highlighting individual agency and the nuances of interpersonal communication within these systems. By combining these methodologies, researchers could address CHAT's limitations in capturing fine-grained interactional details while still leveraging its strengths in systemic analysis. This integration would result in a more comprehensive understanding of digital strategy implementation that encompasses both macro and micro-level dynamics.

These directions for future research hold significant potential to build on the insights of this study, offering new pathways to enhance the effectiveness and inclusivity of digital strategies in educational contexts.

7.4 Reflections on theoretical framework

Engeström's CHAT was crucial in guiding this study, offering a comprehensive lens to examine the complex interactions of *tools, rules, community, and outcomes* within Capel's activity system. CHAT was particularly effective in elucidating systemic contradictions, such as the misalignment between institutional digital strategies and faculty needs, underpinning many of the challenges explored in this research. By focusing on these contradictions, CHAT provided a structured approach to uncover barriers to effective technology integration and identify systemic improvement opportunities.

One of the framework's most significant contributions was its ability to highlight the transformative potential of addressing contradictions through expansive learning. This concept allowed the study to explore how stakeholders could collaboratively resolve systemic tensions and innovate within their activity systems. For instance, the analysis revealed how faculty collaboration to improve technology access could pave the way for broader institutional reforms, demonstrating the value of collective efforts in overcoming entrenched challenges. CHAT also facilitated a nuanced understanding of the sociocultural factors influencing digital strategy adoption, allowing the research to articulate actionable insights into improving alignment between institutional policies and teaching practices.

Despite its strengths, applying CHAT presented certain challenges. The broad systemic focus sometimes made it difficult to capture the finer details of individual agency and the micro-level interactions occurring within the institution. This limitation required careful consideration during data analysis to ensure that individual voices were adequately represented. Additionally, mapping the entire activity system proved resource-intensive, requiring significant time and effort to ensure that all components were thoroughly examined and their interdependencies understood.

Nevertheless, CHAT's ability to integrate diverse elements such as rules, community dynamics, and the division of labour made it particularly well-suited to the goals of this study. Its emphasis on systemic drivers of change provided a rich framework for understanding the interplay of institutional structures and individual practices in shaping digital strategy outcomes. This approach was critical in identifying not only the challenges but also the opportunities for fostering meaningful and sustainable digital transformation in land-based education.

In summary, CHAT offered a powerful tool for exploring the systemic complexities of digital strategy implementation. By revealing key contradictions and opportunities for expansive learning, it guided the research towards actionable conclusions while highlighting areas where further methodological support could enhance future studies. This framework has proven invaluable in addressing the intricate dynamics of TEL in educational settings.

Future research could integrate CHAT with complementary frameworks to address its limitations while retaining its strengths in systemic analysis.

7.5 Conclusion

This study contributes to the growing body of literature on digital technology use in educational settings by applying Engeström's Cultural Historical Activity Theory to uncover systemic contradictions in UK land-based institutions. By focusing on Capel Manor College, the research highlighted barriers such as misaligned tools, inequitable resource distribution, and insufficient training, offering actionable recommendations for policy and practice. Despite its limitations, the study demonstrates the utility of CHAT in analysing and addressing the complexities of digital strategy implementation. Future research can build on these findings to explore sustainable and inclusive approaches to digital transformation in education.

References

- Akpan, V. I., Igwe, U. A., Mpamah, I. B. I., & Okoro, C. O. (2020). Social constructivism: Implications on teaching and learning. *British Journal of Education*, 8(8), 49–56.
- Al-Ali, S. (2020). Activity systems analysis: A maze worth exploring. *Studies in Technology Enhanced Learning*, 1(1). <https://doi.org/10.21428/8c225f6e.39ed7528>
- Atieno, O. P. (2009). An analysis of the strengths and limitations of qualitative and quantitative research paradigms. *Problems of Education in the 21st Century*, 13(1), 13–38.
- Backfisch, I., Lachner, A., Stürmer, K., & Scheiter, K. (2021). Variability of teachers' technology integration in the classroom: A matter of utility. *Computers and Education*, 166, 104–159. <https://doi.org/10.1016/j.compedu.2021.104159>
- Bailey, C. A. (2023). Thematic analysis. In *A guide to qualitative field research*. (3rd ed.) (187). SAGE Publications, Inc. <https://doi.org/10.4135/9781071909614>
- Bayne, S. (2015). What's the matter with 'technology-enhanced learning'? *Learning, Media and Technology*, 40(1), 5–20. <https://doi.org/10.1080/17439884.2014.915851>
- Bligh, B., & Flood, M. (2017). Activity theory in empirical higher education research: choices, uses and values. *Tertiary Education and Management*, 23(2), 125–152. <https://doi.org/10.1080/13583883.2017.1284258>
- Blikstad-Balas, M., Roe, A., Dalland, C. P., & Klette, K. (2022). Homeschooling in Norway during the pandemic-digital learning with unequal access to qualified help at home and unequal learning opportunities provided by the school. *Primary and secondary education during COVID-19: Disruptions to educational opportunity during a pandemic*, 177–201.
- Bond, M., Marín, V. I., Dolch, C., Bedenlier, S., & Zawacki-Richter, O. (2018). Digital transformation in German higher education: student and teacher perceptions and usage of digital media. *International Journal of Educational Technology in Higher Education*, 15(1), 1–20. <https://doi.org/10.1186/s41239-018-0130-1>
- Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide to understanding and doing*. London: SAGE Publications.
- Buchanan, T., Sainter, P., & Saunders, G. (2013). Factors affecting faculty use of learning technologies: implications for models of technology adoption. *Journal of Computing in Higher Education*, 25(1), 1–11. <https://doi.org/10.1007/s12528-013-9066-6>
- Calikoglu, A., Lee, J. J., & Arslan, H. (2022). Faculty International Engagement: Examining Rationales, Strategies, and Barriers in Institutional Settings. *Journal of Studies in International Education*, 26(1), 61–79. <https://doi.org/10.1177/1028315320963508>
- Cartwright, N. (2020). Middle-range theory: Without it what could anyone do? (Teoría del rango medio: ¿qué haríamos sin ella?). *Theoria: An International Journal for Theory, History and Foundations of Science*, 35(3), 269–323.
- Chan, S. (2021). Technology-enhanced learning (TEL) in VET: Theories and approaches to the present. In: *Digitally enabling 'learning by doing' in vocational education: Enhancing 'learning as becoming' processes*. Singapore: SpringerBriefs in Education. https://doi.org/10.1007/978-981-16-3405-5_3
- Chugh, R., Turnbull, D., Cowling, M. A., Vanderburg, R., & Vanderburg, M. A. (2023). Implementing educational technology in Higher Education Institutions: A review of technologies, stakeholder perceptions, frameworks and metrics. *Education and Information Technologies*, 28(12), 16403–16429. <https://doi.org/10.1007/s10639-023-11846-x>
- Cole, M. (1996). *Cultural psychology: A once and future discipline*. Cambridge, MA: Belknap Press of Harvard University Press.

- Correani, A., De Massis, A., Frattini, F., Petruzzelli, A. M., & Natalicchio, A. (2020). Implementing a Digital Strategy: Learning from the Experience of Three Digital Transformation Projects. *California Management Review*, 62(4), 37–56. <https://doi.org/10.1177/0008125620934864>
- Dezelak, Z., Bobek, S., & Zabukovsek, S. S. (2022). User Experience (UX) Comparative Analysis of Distant Learning Solutions Moodle and Microsoft Teams. In *INTED2022 Proceedings* (pp. 4386–4394). IATED.
- El-Sabagh, H. A. (2021). Adaptive e-learning environment based on learning styles and its impact on the development of students' engagement. *International Journal of Educational Technology in Higher Education*, 18(1), 1–24. <https://doi.org/10.1186/s41239-021-00289-4>
- Engeström, Y. (1987). An activity-theoretical approach to developmental research. *Helsinki: Orienta-Konsultit*.
- Engeström, Y. (2001). AODM at Work: Toward an activity theoretical reconceptualization. *Journal of Education and Work*, 14(1), 133–156. <https://doi.org/10.1080/13639080020028747>
- Engeström, Y. (2008). Expansive learning: Toward an activity-theoretical reconceptualization. In: *Contemporary theories of learning* (pp. 61–81). London: Routledge. <https://doi.org/10.4324/9780203870426>
- Engeström, Y., & Sannino, A. (2021). From mediated actions to heterogenous coalitions: four generations of activity-theoretical studies of work and learning. *Mind, Culture and Activity*, 28(1), 4–23. <https://doi.org/10.1080/10749039.2020.1806328>
- Eshet-Alkalai, Y. (2004). Digital Literacy: A Conceptual Framework for Survival Skills in the Digital Era. *Journal of Educational Multimedia and Hypermedia*, 13(1), 93–106.
- Falloon, G. (2020). From digital literacy to digital competence: The teacher digital competency (TDC) framework. *Educational Technology Research and Development*, 68(5), 2449–2472. <https://doi.org/10.1007/s11423-020-09767-4>
- Financial services study reveals emerging tech-driven systemic risks. (2021). *States News Service*.
- Foot, K. A. (2014). Cultural-Historical Activity Theory: Exploring a Theory to Inform Practice and Research. *Journal of Human Behavior in the Social Environment*, 24(3), 329–347. <https://doi.org/10.1080/10911359.2013.831011>
- Graham, C. R. (2018). Current research in blended learning. In *Handbook of distance education* (4th ed.) 13, 173–188. New York: Routledge. <https://doi.org/10.4324/9781315296135>
- Hafifah, G. N., & Sulisty, G. H. (2020). Teachers' ICT Literacy and ICT Integration in ELT in the Indonesian Higher Education Setting. *Turkish Online Journal of Distance Education*, 21(3), 186–198.
- Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, 3(3), 275–285. <https://doi.org/10.1016/j.susoc.2022.05.004>
- Heeks, R. (2021). *From Digital Divide to Digital Justice in the Global South: Conceptualising Adverse Digital Incorporation*. <https://doi.org/10.48550/arxiv.2108.09783>
- Heo, J., & Han, S. (2021). The mediating effect of literacy of LMS between self-evaluation online teaching effectiveness and self-directed learning readiness. *Education and Information Technologies*, 26(5), 6097–6108. <https://doi.org/10.1007/s10639-021-10590-4>
- Herodotou, C., Rienties, B., Hlosta, M., Boroowa, A., Mangafa, C., & Zdrahal, Z. (2020). The scalable implementation of predictive learning analytics at a distance learning university: Insights from a longitudinal case study. *The Internet and Higher Education*, 45, 100725.
- Herrington, J., & Oliver, R. (2000). An Instructional Design Framework for Authentic Learning Environments. *Educational Technology Research and Development*, 48(3), 23–48. <https://doi.org/10.1007/bf02319856>
- Hirsh, Å., & Segolsson, M. (2019). Enabling teacher-driven school-development and collaborative learning: An activity theory-based study of leadership as an overarching practice. *Educational Management, Administration & Leadership*, 47(3), 400–420. <https://doi.org/10.1177/1741143217739363>

- Houben, S. (2011). *Activity Theory Applied to the Desktop Metaphor* (Doctoral dissertation, Ph. D. thesis, Hasselt University, Hasselt).
- Ismail, S. N., Hamid, S., Ahmad, M., Alaboudi, A., & Jhanjhi, N. (2021). Exploring students engagement towards the learning management system (LMS) using learning analytics. *Computer Systems Science & Engineering*, 37(1).
- Kaptelinin, V., & Nardi, B. A. (2009). *Acting with Technology: Activity Theory and Interaction Design* (1st ed.). Cambridge, MA: MIT Press.
- Khomik, O., Bielikova, N., Indyka, S., Kovalchuk, O., & Halan-Vlashchuk, V. (2021). Accessibility of Microsoft Teams and Moodle Services for the Implementation of E-Learning for Students with Disabilities in Institutions of Higher Education in Ukraine. *Fizične Vihovannâ, Sport i Kul'tura Zdorov'â u Sučasnomu Suspîl'stvî (Online)*, 1(53), 33–42. <https://doi.org/10.29038/2220-7481-2021-01-33-42>
- Kilag, O. K., Obaner, E., Vidal, E., Castañares, J., Dumdum, J. N., & Hermosa, T. J. (2023). Optimizing Education: Building Blended Learning Curricula with LMS. *Excellencia: International Multi-disciplinary Journal of Education* (2994-9521), 1(4), 238–250.
- Kim, S., Fan, B., Yang, W. Y., Ramey, J., Fox, S. E., Zhu, H., Zimmerman, J., & Eslami, M. (2024). *Public Technologies Transforming Work of the Public and the Public Sector*. <https://doi.org/10.48550/arxiv.2405.18579>
- Kirkwood, A., & Price, L. (2014). Technology-enhanced learning and teaching in higher education: What is 'enhanced' and how do we know? A critical literature review. *Learning, Media and Technology*, 39(1), 6–36. <https://doi.org/10.1080/17439884.2013.770404>
- Koh, J. H. L., & Kan, R. Y. P. (2021). Students' use of learning management systems and desired e-learning experiences: are they ready for next generation digital learning environments? *Higher Education Research and Development*, 40(5), 995–1010. <https://doi.org/10.1080/07294360.2020.1799949>
- Krašna, M., & Pesek, I. (2020). Influence of Moodle and MS Teams on teaching-learning-studying (TLS) processes. *2020 43rd International Convention on Information, Communication and Electronic Technology (MIPRO)*, 612–616. <https://doi.org/10.23919/MIPRO48935.2020.9245356>
- Krefting, L. (1991). Rigor in qualitative research: The assessment of trustworthiness. *American Journal of Occupational Therapy*, 45(3), 214–222. <https://doi.org/10.5014/ajot.45.3.214>
- Kumar, A., Krishnamurthi, R., Bhatia, S., Kaushik, K., Ahuja, N. J., Nayyar, A., & Masud, M. (2021). Blended Learning Tools and Practices: A Comprehensive Analysis. *IEEE Access*, 9, 85151–85197. <https://doi.org/10.1109/ACCESS.2021.3085844>
- Kundu, A., Bej, T., & Dey, K. N. (2020). An empirical study on the correlation between teacher efficacy and ICT infrastructure. *Campus-Wide Information Systems*, 37(4), 213–238. <https://doi.org/10.1108/IJILT-04-2020-0050>
- Lancaster University (LU). (n.d.). *Research Ethics*. <https://www.lancaster.ac.uk/research/research-services/research-integrity-ethics—governance/research-ethics/#research-and-rd—requires-ethical-approval—421140-0>
- Leithwood, K., Jantzi, D., & Steinbach, R. (1999). Leadership and other conditions which foster organisational learning in schools. In *Organisational learning in schools* (1st ed.) 4, pp. 67–90. London: Taylor & Francis. <https://doi.org/10.1201/9781003077459>
- Limani, Y., Hajrizi, E., Stapleton, L., & Retkoceri, M. (2019). Digital Transformation Readiness in Higher Education Institutions (HEI): The Case of Kosovo. *IFAC-PapersOnLine*, 52(25), 52–57. <https://doi.org/10.1016/j.ifacol.2019.12.445>
- Maheshwari, G. (2021). Factors affecting students' intentions to undertake online learning: an empirical study in Vietnam. *Education and Information Technologies*, 26(6), 6629–6649. <https://doi.org/10.1007/s10639-021-10465-8>
- Maimaiti, G., Jia, C., & Hew, K. F. (2023). Student disengagement in web-based videoconferencing supported online learning: an activity theory perspective. *Interactive Learning Environments*, 31(8), 4883–4902. <https://doi.org/10.1080/10494820.2021.1984949>
- Mwanza-Simwami, D. (2011). AODM as a framework and model for characterising learner experiences with technology. *Journal of e-learning and knowledge society*, [online] 7(3), pp.75–85. <https://doi.org/10.20368/1971-8829/553>

- OECD Digital Education Outlook 2023: Towards an Effective Digital Education Ecosystem. (2023). OECD Publishing. <https://doi.org/10.1787/c74f03de-en>
- Oliveira, G., Grenha Teixeira, J., Torres, A., & Morais, C. (2021). An exploratory study on the emergency remote education experience of higher education students and teachers during the COVID-19 pandemic. *British Journal of Educational Technology*, 52(4), 1357–1376. <https://doi.org/10.1111/bjet.13112>
- Önalın, O., & Kurt, G. (2020). Exploring Turkish EFL teachers' perceptions of the factors affecting technology integration: A case study. *Journal of Language and Linguistic Studies*, 16(2), 626–646. <http://dx.doi.org/10.17263/jlls.759264>
- Övcharuk, O., Ivaniuk, I., Soroko, N., Gritsenchuk, O., & Kravchyna, O. (2020). The use of digital learning tools in the teachers' professional activities to ensure sustainable development and democratization of education in European countries. *E3S Web of Conferences*, 166, 10019. <https://doi.org/10.1051/e3sconf/202016610019>
- Palincsar, A. S. (1998). Social constructivist perspectives on teaching and learning. *Annual Review of Psychology*, 49(1), 345–375. <https://doi.org/10.1146/annurev.psych.49.1.345>
- Parveen, S., & Ramzan, S. I. (2024). The role of digital technology in education: Benefits and challenges. *International Research Journal on Advanced Engineering and Management*, 2(6), 2029–2037. <https://doi.org/10.47392/IRJAEM.2024.0299>
- Passey, D. (2019). Technology-enhanced learning: Rethinking the term, the concept and its theoretical background. *British Journal of Educational Technology*, 50(3), 972–986. <https://doi.org/10.1111/bjet.12783>
- Pervin, N., & Mokhtar, M. (2022). The interpretivist research paradigm: A subjective notion of a social context. *International Journal of Academic Research in Progressive Education and Development*, 11(2), 419–428.
- Pettersson, F. (2021). Understanding digitalization and educational change in school by means of activity theory and the levels of learning concept. *Education and Information Technologies*, 26(1), 187–204. <https://doi.org/10.1007/s10639-020-10239-8>
- Price, S., Oliver, M., Fartunova, M., Jones, C., Van der Meij, H., Mjelstad, S., Mohammad, F., Nikolov, R., Wake, J., & Wasson, B. (2005). *Review of the impact of technology-enhanced learning on roles and practices in Higher Education*. Kaleidoscope deliverable, 30(2)1.
- Quezada-Morales, R. Q. M. (2022). Chile's digital learning strategy during the COVID-19 pandemic. *Current Issues in Comparative Education*, 24(2). <https://doi.org/10.52214/cice.v24i2.9495>
- Raes, A., Vanneste, P., Pieters, M., Windey, I., Van Den Noortgate, W., & Depaepe, F. (2020). Learning and instruction in the hybrid virtual classroom: An investigation of students' engagement and the effect of quizzes. *Computers and Education*, 143, 103682. <https://doi.org/10.1016/j.compedu.2019.103682>
- Roth, W.-M., & Lee, Y.-J. (2007). "Vygotsky's Neglected Legacy": Cultural-Historical Activity Theory. *Review of Educational Research*, 77(2), 186–232. <https://doi.org/10.3102/0034654306298273>
- Roth, W.-M., Lee, Y.-J., & Hsu, P.-L. (2009). A tool for changing the world: possibilities of cultural-historical activity theory to reinvigorate science education. *Studies in Science Education*, 45(2), 131–167. <https://doi.org/10.1080/03057260903142269>
- Sannino, A., Engeström, Y., & Lemos, M. (2016). Formative Interventions for Expansive Learning and Transformative Agency. *The Journal of the Learning Sciences*, 25(4), 599–633. <https://doi.org/10.1080/10508406.2016.1204547>
- Schatzki, T. R. (2001). Practice mind-ed orders. In T. R. Schatzki, K. Knorr Cetina, & E. von Savigny (Eds.), *The practice turn in contemporary theory* (42–55). London: Routledge.
- 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 and Education*, 128, 13–35. <https://doi.org/10.1016/j.compedu.2018.09.009>
- Schoch, K. (2020). Case study research. In G. J. Burkholder, K. A. Cox, L. M. Crawford, & J. H. Hitchcock (Eds.), *Research design and methods: An applied guide for the scholar-practitioner* (245–258). Thousand Oaks, CA: SAGE Publications, Inc.

- Shamoo, A., & Khin-Maung-Gyi, F. A. (2021). *Ethics of the use of human subjects in research: Practical guide*. Boca Raton, FL: CRC Press.
- Sharifov, M., Safikhanova, S., & Mustafa, A. (2021). Review of Prevailing Trends Barriers and Future Perspectives of Learning Management Systems (LMSs) in Higher Education Institutions. *International Journal of Education and Development Using Information and Communication Technology*, 17(3), 207–216.
- Tight, M. (2017). Selection, context and theory in case study. In *Understanding case study research: Small-scale research with meaning* (137). SAGE Publications Ltd. <https://doi.org/10.4135/9781473920118.n8>
- Timotheou, S., Miliou, O., Dimitriadis, Y., Sobrino, S. V., Giannoutsou, N., Cachia, R., Monés, A. M., & Ioannou, A. (2023). Impacts of digital technologies on education and factors influencing schools' digital capacity and transformation: A literature review. *Education and Information Technologies*, 28(6), 6695–6726. <https://doi.org/10.1007/s10639-022-11431-8>
- Tsiakara, A. (2023). *A framework for strategic planning of data analytics in the educational sector* (Doctoral dissertation, Middlesex University).
- Turner, J. C., Christensen, A., Kackar-Cam, H. Z., Fulmer, S. M., & Trucano, M. (2018). The Development of Professional Learning Communities and Their Teacher Leaders: An Activity Systems Analysis. *The Journal of the Learning Sciences*, 27(1), 49–88. <https://doi.org/10.1080/10508406.2017.1381962>
- Vygotsky, L. S. (1978). *Mind in society: Development of higher psychological processes*. M. Cole, V. John-Steiner, S. Scribner, & E. Souberman (Eds.). A. R. Luria, M. Lopez-Morillas & M. Cole [with J. V. Wertsch] (Trans.). Cambridge, MA: Harvard University Press. (Original manuscripts [ca. 1930–1934]).
- Watson, J., Pape, L., Murin, A., Gemin, B., & Vashaw, L. (2014). *Keeping pace with K-12 digital learning: An annual review of policy and practice*. Evergreen Education Group.
- Webster, A., & Gardner, J. (2019). Aligning technology and institutional readiness: the adoption of innovation. *Technology Analysis & Strategic Management*, 31(10), 1229–1241. <https://doi.org/10.1080/09537325.2019.1601694>
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Los Angeles, CA: SAGE Publications, Inc.
- Yu, W. (2023). The Dimensions of Expansive Learning in the Workplace: A Multicase Study from Activity Theory. *Psychology in the Schools*, 60(11), 4332–4349. <https://doi.org/10.1002/pits.23073>

Acknowledgements

This research was undertaken as part of the PhD in e-Research and Technology Enhanced Learning in the Department of Educational Research at Lancaster University. I am pleased to acknowledge the contribution of tutors and peers in supporting the development of this study and its report as an assignment paper.



About the author

Nico Daniel Smit serves as a Business and Digital Skills Lecturer at Capel Manor College, where he plays a pivotal role in shaping the future of education through innovative teaching methodologies and immersive learning experiences. With over 26 years of experience in both education and corporate training, Nico is a PhD doctoral researcher who is deeply committed to fostering meaningful learning communities. His expertise spans a wide array of subjects, including Business Administration and Management, Project Management, and Adult Professional Studies, making him a subject matter expert in integrating Information and Communication Technologies (ICTs) into educational frameworks.

✉ n.smit@lancaster.ac.uk

ORCID [0009-0009-0102-8199](https://orcid.org/0009-0009-0102-8199)

Open Access (CC BY 4.0)

© 2020 The Authors. This article is distributed under Creative Commons Attribution 4.0 International licence.



You are free to

- Share — copy and redistribute the material in any medium or format
- Adapt — remix, transform, and build upon the material for any purpose, even commercially.

Under the following terms:

- Attribution — You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.
- No additional restrictions — You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

The full licence conditions are available at: <https://creativecommons.org/licenses/by/4.0/>

