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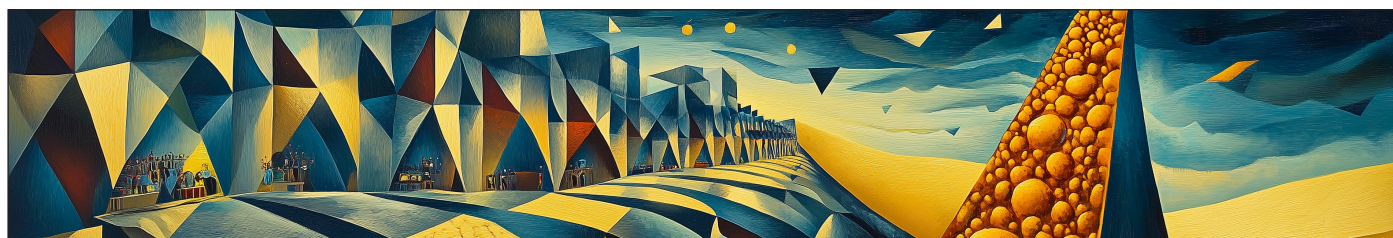
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Adopting principles of Cultural-Historical Activity Theory to conceptualise digital pedagogy practices in the post-16 education sector and their implications on teaching and learning

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Keywords

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Abstract

The purpose of this study was to conceptualise how teachers in the post-16 education sector in the U.K. use digital technologies in their pedagogy practice. The motivation for this study originated from prior literature review research on the level of digital technology capabilities of post-16 teachers individually and their adoption of technology innovation in the classroom. This paper contributes to the literature as it takes a broader view that looks at an institution's practices and considers departmental variables. Moreover, the use of activity system as the unit of analysis guided by Cultural-Historical Activity Theory framework enabled consideration of sociocultural aspects by focusing not only on the practitioner but also how digital pedagogy is embedded within the practice environment. The analysis focusses on identifying: (RQ1) what motivates teachers in the post-16 sector to integrate ICT into their pedagogical practices; (RQ2) how digital pedagogy practices are being implemented in post-16 teaching and learning; and (RQ3) what contradictions are experienced in these digital pedagogy activities. The research findings contribute to the literature by establishing how the limited digital pedagogy practice in the setting arises from teachers' inter-institutional struggles, due to their professional commitment and the lack of adequate support for continual development in place. However, further research on how teachers can access a wider repertoire of mediational means to support and overcome contradictions in their digital pedagogy practices is needed.

1. Introduction

This paper contributes to the literature by emphasising the overdue recognition of the post-16 sector teachers' inter-institutional struggle initiated by their ongoing commitment to enhancing teaching and learning through digital pedagogy practice despite a lack of adequate support. Much of the recent literature on digital pedagogy practices in the post-16 sector has been dominated by a debate on teachers' role as central to digitalising education (Wohlfart & Wagner, 2023), with their beliefs and attitudes (Vongkulluksn, Xie, & Bowman, 2018), and their lack of clear understanding of how technology could support learning (Attwell & Gerrard, 2019) seen as prevalent barriers toward technology integration. Moreover, a recent report (Jisc, 2020), characterised post-16 sector teachers as not sufficiently equipped with skills and capabilities to implement digital pedagogy practices with an apparent gap in the level of digital literacy between staff and students with the latter being more experienced in technology use. Adding to that the UNESCO-UNEVOC (2022), identified deficiencies in the digital competencies of the post-16 sector teachers affecting the attainment of high-quality, learner-centred, technology-enhanced training.

Educational programmes are part of the historically embedded cultural systems with collective practices that can be contradictory and heterogeneous (Havnes, 2004). Teachers are the interlink between institutional expectations, intentions, curriculum materials, and their digital practices. This interrelationship can cause pedagogical conflicts and tensions for teachers. The literature review on digital pedagogy practices shows a dominance of conceptualisations using knowledge-based frameworks, such as technological content knowledge TPACK (Gierhart & Seglem, 2024), which was built on a pedagogical content knowledge (PCK) framework developed by Shulman (1986). However, studies (Watulak & Kinzer, 2013; Rust, 2017), found that the use of these frameworks is ineffective in providing an authentic depiction of the challenges that teachers face in implementing digital pedagogy. Moreover, this 'static', 'one-dimensional' view is often presented without the recognition of social context and structures inherent in the environment and the relationship between the adoption of innovation and its dependency upon the ability to address arisen tensions. However, those tensions in the context of teaching are not external to the teaching itself.

This study focuses on conceptualising digital pedagogy practices from a Cultural-Historical Activity Theory perspective, as it allows for studying workplace learning in organisational setting generated from a collaborative professional

activity (Cong-Lem, 2022). Moreover, it opens possibilities for an examination of change and development as it implies searching for tensions in the teaching context and mechanisms by which these tensions make their way into the teaching process as a social phenomenon. By focusing on action patterns typical to a specific social setting and embedded in organisational structure, this research aims to understand the digital pedagogy practices of the teachers as they fit into an institutional context. This perspective allows for problematising the complexity that arises from the scope of digital pedagogy, seen as an activity system as a holistic unit of analysis.

A case study design was used and carried out in a general further education college on the outskirts of the Lake District, Cumbria. Adopting a theoretical framework based on principles of Cultural-Historical Activity Theory helped to identify and shape the following main research questions:

- *RQ1.* What motivates teachers in the post-16 sector to integrate ICT into their pedagogical practices? (What is the object of the activity system that drives the outcome?)
- *RQ2.* How are digital pedagogy practices being implemented in post-16 teaching and learning? (The wider activity system around each object including the mediating roles of the tools.)
- *RQ3.* What contradictions are experienced in these digital pedagogy activities?

2. Literature review

This section discusses digital pedagogy practices in the post-16 sector to conceptualise its applications in the teaching and learning spectrum.

A literature review was conducted to support this case study, therefore, focused on three strands of digital pedagogy practice: social influence, facilitating conditions, and digital competence. The articles were selected based on the following inclusion criteria:

- Language: Written in English.
- Settings: Related to the digital pedagogy practices in the post-16 education sector.
- Date of publication: 2005 to 2024.
- Scope: Keywords were used to identify literature with a focus on the content relevant to any of the research questions.

2.1 Digital pedagogy in the post-16 sector

The concept of digital pedagogy remains unclear due to not only a varied lexical set of terms in the educational sector such as ‘digital literacy’, ‘digital technology/tools’, or ‘digital didactics’ (Toktarova & Semenova, 2020), but also the spectrum of its practical applications in different educational contexts and resources (Istrate, 2022). Oxford University Press (Oxford University Press) defines digital pedagogy as the study of teaching using digital technologies with social and educational imperatives as a driving factor behind its implementation. JISC (2020/2021) adds to the description by defining digital pedagogy as “the study of how digital technologies can be used to best effect in teaching and learning”.

Some areas of literature refer to digital pedagogy as a branch of pedagogical science that reveals the essence and regulation of digital education (Ilaltdinova, Belyaeva, & Lebedeva, 2019), others as systematic activity of human formation through education with the use of information technologies (Tokarova, 2018), with some as synchronous and asynchronous interactions in mixed and virtual learning environments (Istrate, 2022).

The literature review supporting this case study suggests three dominant strains within the debate on factors determining teachers’ digital pedagogy practices. Those strains are discussed in the following subsections.

2.1.1 Social influence on the implementation of digital pedagogy practice

The literature review suggests that teachers’ beliefs that technology can help their instructional goals defines the extent of digital pedagogy use and its meaningful integration within the practice. Studies (Ross, Hogaboam-Gray, & Hannay, 2001; Wood, Muller, Willoughby, Specht, & Deyoung, 2007), have concerned the areas such as teachers’ attitudes, and emotions as meaningful stimuli motivating to implementation of digital pedagogy into practice. Other studies (Yang, Guo, & Cui, 2023), stated teachers’ external, subjective norm factors and pointed towards social influence as the contributor to teachers’ positive and negative outcome beliefs of digital pedagogy. Another (Zhang & Shuiyun, 2021), concerned the performativity and peer pressure. However, some (Karel, Acker, Vermeulen, & Buuren, 2013),

stated that the variables of attitude and self-efficacy (Bandura, 1977), or resistance to educational innovation (Blin & Munro, 2008), are the main barriers to digital pedagogy practice. A view commonly found among researchers is that teachers’ value beliefs towards technology are highly predictive indicators of the quality and quantity of digital pedagogy practices (Vongkulluksn, Xie, & Bowman, 2018).

2.1.2 Facilitating conditions of digital pedagogy

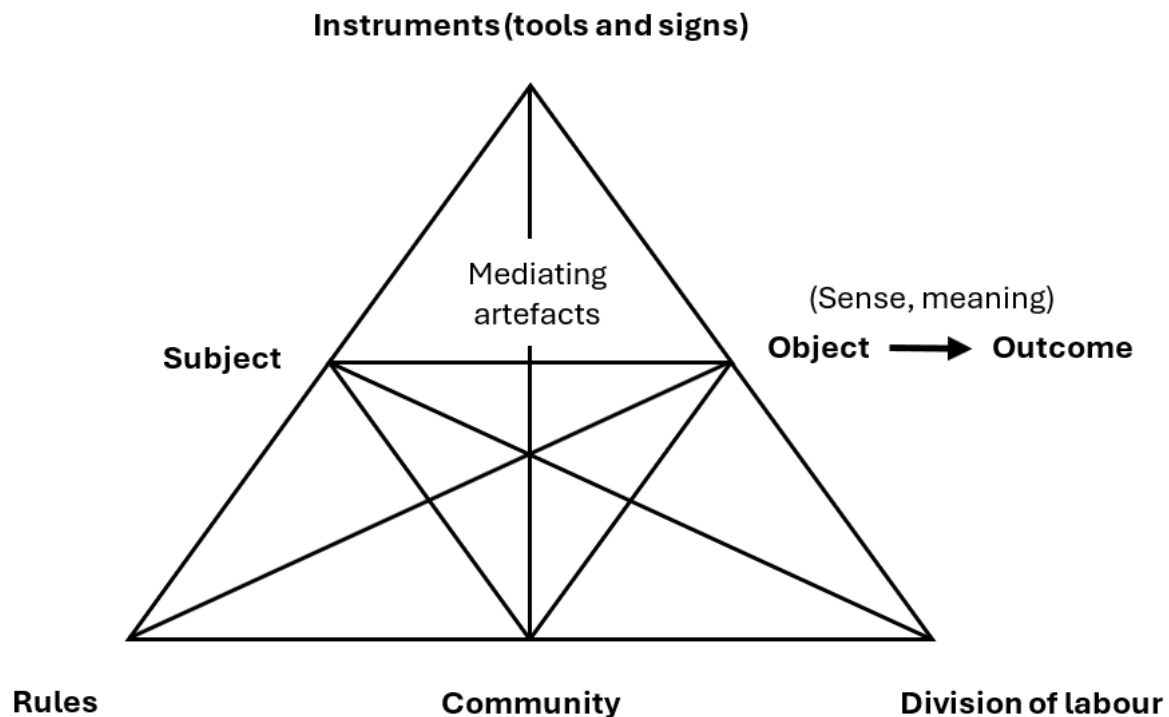
Despite the increased availability of technology access, with institutions working towards promoting digital pedagogy practices (Ertmer, et al., 2012), some studies (Brown & Venkatesh, 2005), point towards facilitating conditions as existing barriers to its implementation. The college-wide administrative support with limited or restricted access to technology devices (Hew & Brush, 2007), alongside sufficient time allocation to access technical support or prepare for meaningful implementation of digital pedagogy practice (Kopcha, 2012), being seen as factors affecting their applications.

2.1.3 Digital competence in the implementation of digital pedagogy practices

Extensive research has been carried out on teachers’ digital competence with studies (Brun & Hinojosa, 2014; Bower, Highfield, Furney, & Mowbray, 2013; Krumsvik, 2011) identifying it as the defining the ability to incorporate digital technology into pedagogical practice. Studies (Kim, Xie, & Cheng, 2017) concern knowledge and skills on how to use specific technologies to embed digital pedagogy practices as a key to managing student activities with technology.

While those studies are important, as providing valuable, thought-provoking, comprehension, they lack a broader, coherent account of an individual’s digital pedagogy practice as a set of collective co-depending elements that are in constant co-interaction with its various levels of institutional, educational, and socioeconomic contexts. The view considering motivation accentuating teachers’ environment and practice as a complex social system has not been considered. Taking on such a perspective the findings from this study bring a worthy insight that contributes towards an indispensable step in conceptualisation of digital pedagogy practices in the post-16 sector and their implications on teaching and learning.

Figure 1. Engeström's (1987) model of the socially distributed activity system



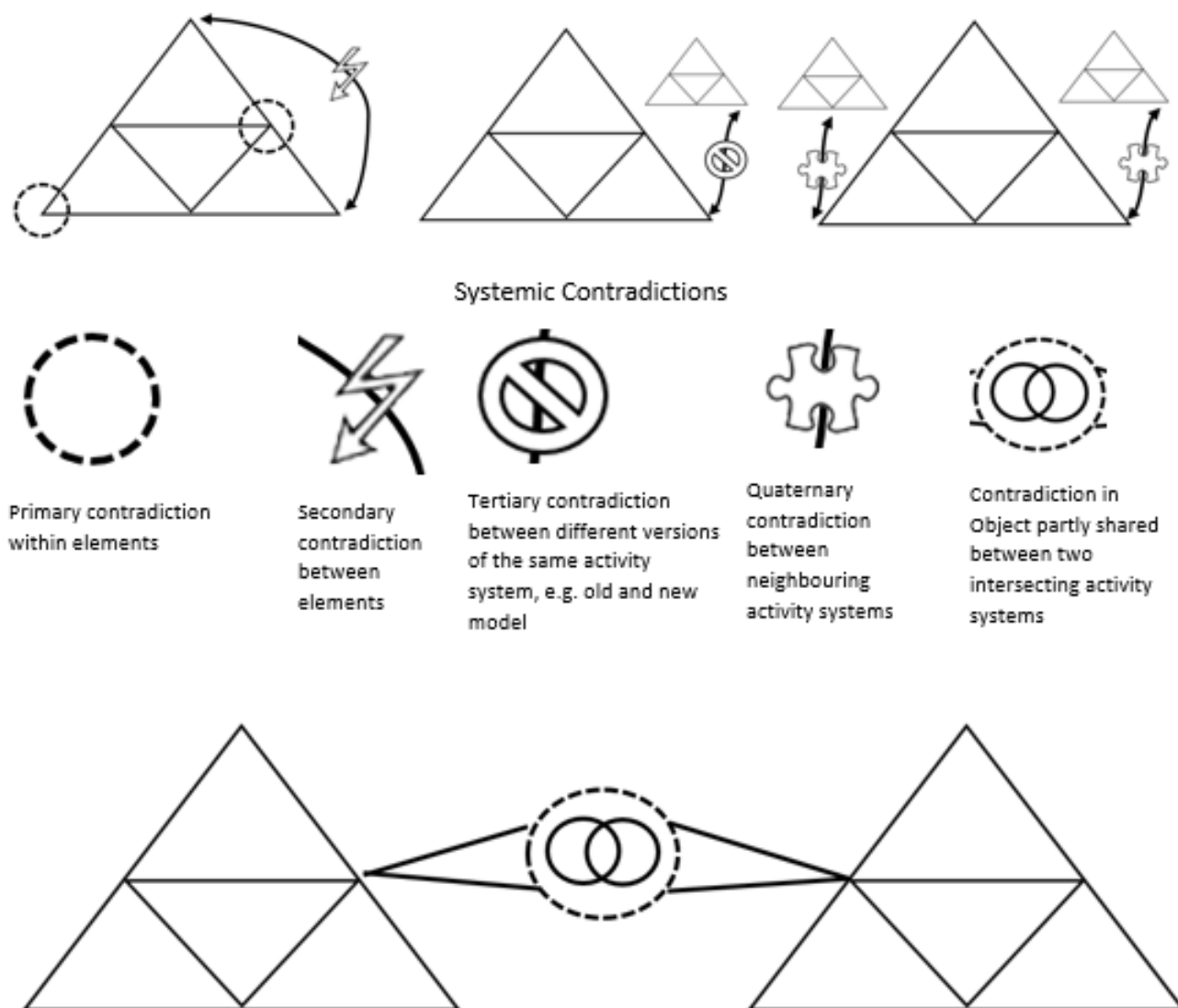
3. Theoretical framework

The design for this research was developed through a pragmatic approach and with the interpretivist epistemology and constructionist ontology of the researcher. Pragmatism consents to methodologically eclectic approaches to research and takes on both interpretative and positivist epistemologies based on applicability, regarding reality as both subjective and socially constructed (Cohen, Manion, & Morrison, 2011). Methodologies employed within the Activity Theory paradigm are collaborative and dialectic, qualitative and quantitative (Kaptelinin & Nardi, 2006), with the concept of activity forming a basis for understanding the nature of knowledge and reality (Littlejohn, 2007). It accepts that the construction of activities happens through material and discursive, object-oriented actions and takes an activity system as a unit of analysis with consideration of the complementarity of the systemic view and the subjective-partisan's view (Engeström, Miettinen, & Punamaki, 1999). The dialectic between those views enables a dialogical relationship with the investigated activity.

As this research adopts the principles of a Cultural-Historical Activity Theory, it uses the activity system model (Engeström, 1987), which originates from sociocultural theories of learning and development structured on a

system-based methodology (Russell, 2005). Cultural-Historical Activity theory sees activity as a collective system of elements, sustained human effort conceived as a relationship between the 'subjective' and the 'objective' within a single reality; action as time-bounded pursuits of goals; and operation as what individuals do without pre-meditation (Bligh & Flood, 2017). The activity system model (Engeström, 1987), seen as one general professional activity under the examination (Cong-Lem, 2022), comprehends a complex social system by identifying the concepts used as instruments in developing these systems (Russell & Schneiderheinze, 2005). Its structure comprises a three-way interaction between 'subject', 'object', and 'community' (Kaptelinin & Nardi, 2012). It enables to place teachers, digital technologies, learners, pedagogical strategies, communities, and rules as interdependent elements of collective activity; therefore, it allows for analysis from a holistic socio-technical perspective (Mykhailenko, Blayone, Zogla, & Lubkina, 2019). It is both a practice-based and a historical and future-oriented theory (Sannino, Daniels, & Gutierrez, 2009). It enables the distinction between short, goal-directed action and durable, object-oriented historically advancing collective activity system placed within its network relations to other activity systems (Engeström, 2000); thus allowing for the conceptualisation of the activity level within the theory (Bligh & Flood, 2017) (see Figure 1).

Figure 2. Graphical representation of systemic contradictions, from Bligh and Flood (2015)



The activity system model suggests a three-way interaction mediated by (a) instruments/tools for the subject-object interaction, (b) rules for the subject-community interaction, and (c) division of labour for the community-object interaction (Kaptelinin & Nardi, 2006). Those interactions prompt constant development of the activity system and are understood dialectically as a process driven by contradictions (Kaptelinin & Nardi, 2012). The analysis of unfolding contradictions between systemic elements that support and undermine each other manifests subjective dilemmas (Bligh & Flood, 2017), that emerge within the activity

system (Camilleri, 2022) as participants negotiate those tensions. Moreover, as contradictions arise from within the very processes and innate in their subject matter, thus, are the expression of the state of the system (Ollman, 2003). Engeström's (1987) classification of origins of contradictions allows the distinction between one that occurs within elements of activity (primary), one between elements of activity (secondary), those between existing forms of the activity (tertiary), and those between an activity system and its neighbouring ones (quaternary) (Bligh & Flood, 2015) (see Figure 2).

The accentuation that human activity is driven by communal motives (Engeström, 2000), and is mediated by tools, which accumulate and transmit social knowledge and are created and transformed during the development of the activity itself (Littlejohn, 2007), allows to map the interrelationships between subject and the elements of the activity (see Figure 1). In this research, the use of an activity system enabled to identification of the characteristics and challenges of purposeful attempts to implement digital pedagogy within various systems of activity that orient subjects (teachers) toward an object (teaching). Moreover, it shows that this activity system is mediated by the division of labour and social rules that structure interaction within this community. These rules can be seen as the institutional setting of a college, or educational legislations. The division of labour and rules although established are shiftable over the periods and serve collective motives that create the object of the activity. Mediating instruments used within this activity system encompass concepts e.g., digital pedagogy practice, as well as material tools e.g., digital tools and technologies. Tools and elements of community shape how the subject(s)/teacher(s) adopt, assume, and perform in and for a particular activity.

This methodological approach of object-oriented and artefact-mediated activity, with an activity system used as a unit of analysis, represents a challenge to traditional thinking in social sciences. It retains the importance of subjectivity while amalgamating it with cultural means and constraints allowing to merge society into activity (Sannino, Daniels, & Gutierrez, 2009). It goes beyond the individuals and looks at the cultural systems and mechanisms that underpin action patterns (Havnes, 2004); thus, allowing for conceptualising digital pedagogy practices in the post-16 sector and their implications on teaching and learning from a new perspective. Moreover, its distinctive characteristics of the descriptive and diagnostic analysis of the consensus-driven codesign system of collective actions (Sannino, 2011), offers a way of modelling organisational change (Spinuzzi, 2020).

4. Research design

4.1 Methodology

A case study design has been chosen as it allows to focus on a specific action of a specific group within a specific narrative and within a specific real-life context (Yin, 1994); thus, naturally shaped in a descriptive form.

This method is often suggested to have limitations as the generalisation process might not be possible to be applied to the wider society. Furthermore, as the case study used an anonymous questionnaire as an instrument to collect data, thus, the ability to fully investigate its context was limited. Further research across other institutions and with the use of qualitative methods needs to be carried out.

4.2 Research site

The research site for this project is a general further education college located on the outskirts of the Lake District. This college differentiates 24 departments that provide a range of vocational, academic, and higher education courses, as well as apprenticeships. This college has three sites and has around 1,300 learners on education programmes for young people and around 730 adult learners studying courses at levels 1 to 3. The remainder study access to higher education courses. There are 73 learners with high needs, with 10 learners on a supported internship. Around 800 apprentices study at levels 2 to 5 in areas such as education, management, and engineering.

4.3 Study participants

To address the research question, the project was designed to gather data from participants representing a wide range of subject specialisms, ages, educational backgrounds, teaching experience, and teaching qualifications, thus, all teaching staff were invited to take part in the study. Nineteen out of approximately 250 teachers with varied subject specialism, teaching qualifications, ages, and years of teaching experience agreed to take part in the research by completing the questionnaire. The number of responders determined the sample size; thus, the limitation of this study is that the findings are indicative rather than representative (Henn, Weinstein, & Foard, 2009).

4.4 Research instrument

The theoretical framework guided the creation of an anonymous questionnaire with a mix of qualitative and quantitative questions which was used as a data-generating instrument. Every question was designed to support the identification of the elements within the activity system (Engeström, 1987), and identification of the potentially arising contradictions. Open-ended, less structured questions allowed responders to explain and qualify their responses without the limitations of pre-set categories; thereby, aiming

to permit the capture of the specificity of a particular situation. Closed questions were used to gather data such as subject specialism, and years of professional practice and in instances where they can replace vast quantities of word data. Additionally, the questionnaire allowed for structured and timely responses without the presence of the researcher (Cohen, Manion, & Morrison, 2011); therefore, respecting the responders' workload.

4.5 Data analysis

Qualitative and quantitative data collected in this study relate to teachers' digital practice. This included the motivation behind and ways of implementing the range of mediating tools used to achieve the potential outcome; digital pedagogy practices; the challenges teachers potentially encounter when implementing digital pedagogy practices and their methods of addressing them.

The quantitative data from the questionnaire was extracted and analysed using thematic analysis. Both quantitative and coded qualitative data were mapped to the corresponding elements of the activity system model (Engeström, 1987). This allowed for the creation of 9 activity system models where each one demonstrated findings from each participating department (see Figures 3 to 11). This study has purposely included the age, educational background, subject specialism, and years of experience of its participants which were identified as the subject to align with the theoretical framework and to set social narrative and context.

For the purpose and clarity of this research, those were called 'Departmental Activity Systems'. Each Departmental Activity System particularised its elements and allowed to highlight the unique corollary of its internal and external relations, and tensions were marked as contradictions.

Following that, the common elements of each departmental activity system were extracted and analysed. This allowed for the identification of cross-college commonalities and contradictions, thus, for the conceptualisation of digital pedagogy practice in the post-16 sector and its implications on teaching and learning.

4.6 Ethics

This case study was carried out in compliance with the extant guidelines of the British Educational Research Association at that time (BERA, 2018). Before conducting the study, an agreement to carry out the research was obtained from Lancaster University and the FE college director. All participants were informed about the study background through the participant information sheet on the front page of the questionnaire. The participant information sheet included consent to take part in research and a protocol regarding anonymity to protect participants. The consent form made it clear to participants that completing the questionnaire indicated their consent.

5. Findings

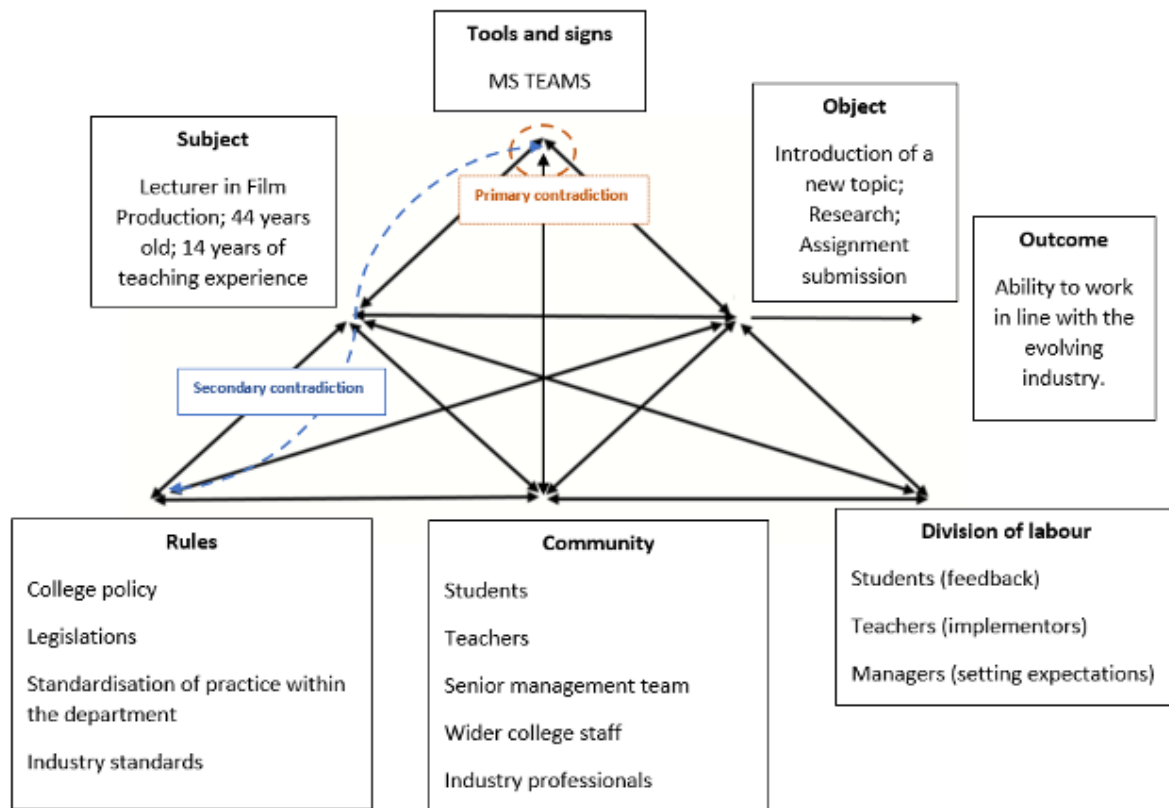
In this section, the principles of Cultural-Historical Activity Theory are used to categorise findings from this study to answer the research question. Data are classified following the elements of the activity system (Engeström, 1987) (see Table 1).

This categorisation was used to create 9 departmental Activity Systems (see Figure 3 to Figure 11). Data extracted from the Department Activity Systems were mapped to form a Cross-College Activity System of Digital Pedagogy Practice and allowed to identification of primary and secondary contradictions (see Table 2).

Table 1. Elements of the activity system

Subject	Rules	Instruments (tools and signs)	Community	Division of Labour	Object	Outcome	Primary contradiction	Secondary contradiction
People, team, group that drives the activity system	Official and conventional rules that people in this activity system follow	Artefacts that help people work on the objects	All other stakeholders involved in this activity system	How do people work together and take on different roles over time	What is this activity working on	What is this activity trying to achieve by working on the object?	Tensions that occur within elements of activity	Tensions that occur between elements of activity

Figure 3. Activity System of digital pedagogy practices in the Film Production Department with identification of primary and secondary contradictions



5.1 Departmental activity systems

5.1.1 Activity system of the digital pedagogy practices in the Film Department

5.1.1.1 Object of activity

Despite the limited use of digital technology tools in pedagogical practice, the object of this activity system is teachers' motivation to enable learners to develop skills that will equip them to be successful in the ever-evolving film industry (see Figure 3).

5.1.1.2 Implementation

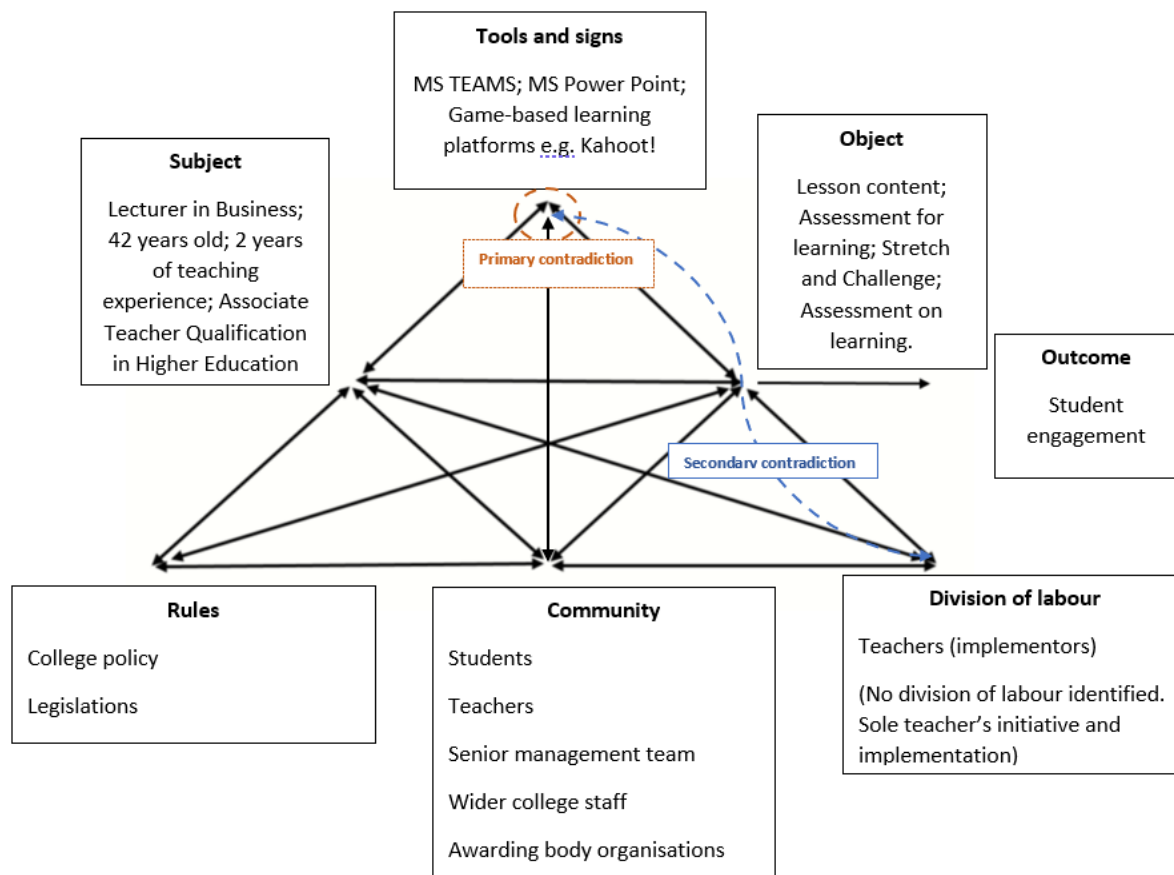
Findings show the limited use of digital technology tools in teaching and learning (see Figure 3). When asked about the selection process between digital tools, the participant stated that the implementation is purposely limited to only fulfil the minimum requirement set by the institution.

5.1.1.3 Contradictions

Tools are the primary contradiction within this activity system as when asked to describe the typical digital pedagogy practices, the participant stated that she tries to avoid screen-based teaching as she hopes to promote direct human interaction.

A secondary contradiction is triggered by attempts at standardisation of practice within the department, which suggest the implementation of preferable digital technology such as MS Teams to enhance teaching and learning, which contradicts the teachers experience of the same tool as undermining teaching and learning, thereby leading to an unwillingness to follow the policy.

Figure 4. Activity System of digital pedagogy practices in Business Department with identification of primary and secondary contradictions



5.1.2 Activity system of the digital pedagogy practices in the Business Department

5.1.2.1 Object of activity

In this activity system, teachers use a wide range of digital tools in their teaching and learning practice. The object of the activity is to ensure student engagement.

5.1.2.2 Implementation

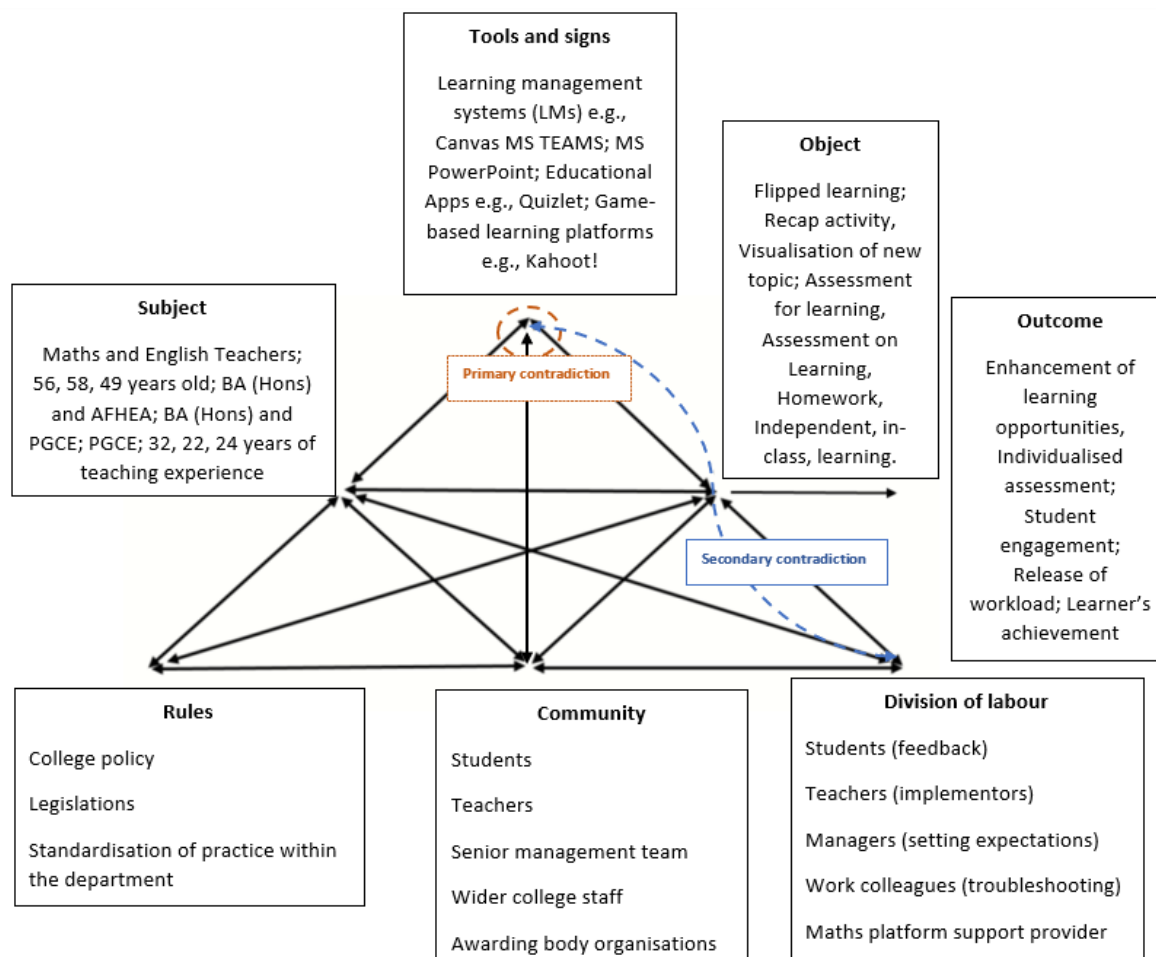
Findings show that participants use few digital technology tools (see Figure 4) with participants stating, 'Ease of use' and 'Free access' as predominant reasons for their implementation.

5.1.2.3 Contradictions

When asked about the main challenges in implementing digital pedagogy, the participant stated 'Difficult choices between digital tools and technology'. Moreover, when asked about support in implementing educational digital technology, the participant stated that he is unaware of any and that this is the sole teacher's responsibility. The participant rated the professional development opportunities with the lowest score.

The analysis of findings allowed to identify primary contradictions (tools) and secondary contradictions as they occur due to a lack of developmental support from the institution resulting in an inability to effectively implement digital pedagogy in teaching and learning (see Figure 4).

Figure 5. Activity System of digital pedagogy practices in Maths and English Department together with identified primary and secondary contradictions



5.1.3 Activity system of the digital pedagogy practices in the Maths and English Department.

5.1.3.1 Object of activity

The activity system of the Maths and English Department teachers not only uses a wide range of digital technology tools but they are utilising them in an array of pedagogy practices to achieve an outcome that not only benefits learners but also has a direct positive impact on their workload (see Figure 5).

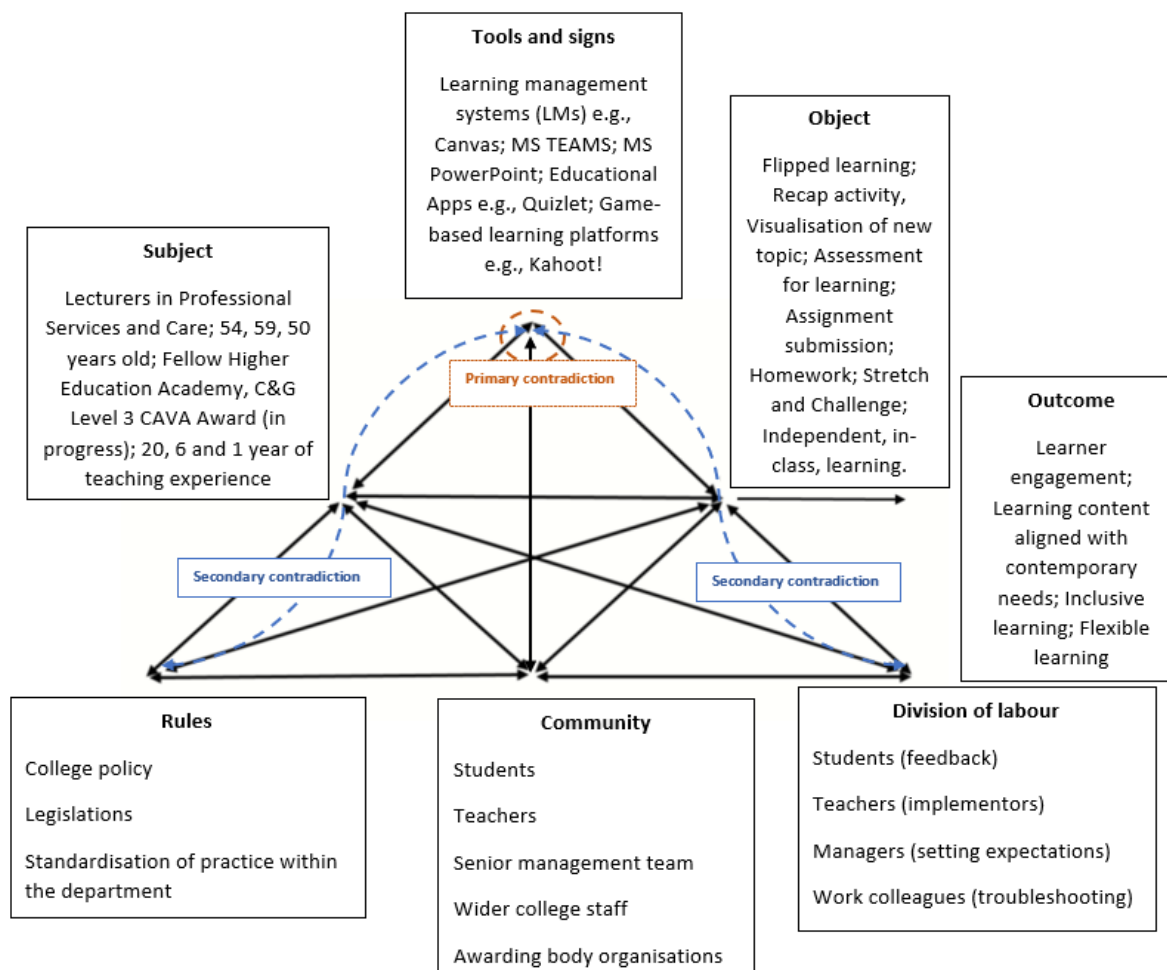
5.1.3.2 Implementation

Findings show that participants use various digital tools (see Figure 5) with two out of three teachers stating 'Ease of use', and 'Positive feedback from learners' as the main contributing factors in their implementation.

5.1.3.3 Contradictions

However, when asked what challenges they encountered when implementing digital pedagogy practices, participants responded with one stating 'Difficult choices between technologies', one 'Lack of confidence', and one 'Not knowing whether is working'. When asked what support structures are in place all three participants stated the lack of professional development and interinstitutional support with two stating 'Feedback from Learners' and one adding 'colleagues forum' as the main point for development. This activity identifies secondary contradictions as they occur between elements of the activity (see Figure 5).

Figure 6. Activity System of digital pedagogy practices in Professional Services and Care Department with identified primary and secondary contradictions



5.1.4 Activity system of the digital pedagogy practices in the Professional Services and Care Department

5.1.4.1 Object of activity

This activity system shows that despite the spectrum of teaching experience within the team, all teachers use a wide range of differentiated digital tools in their practice. The object of this activity is for teachers to provide an inclusive learning environment aligned with the needs of contemporary society.

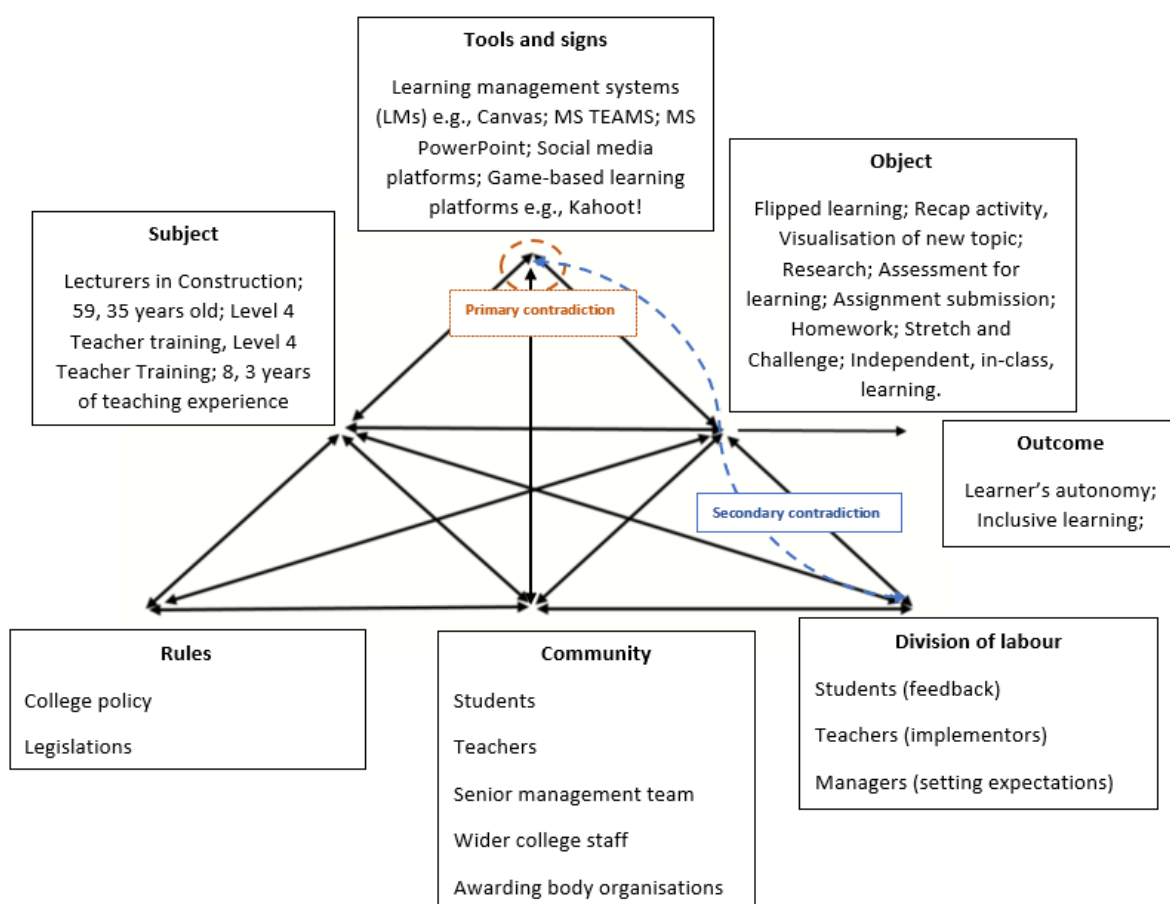
5.1.4.2 Implementation

Findings show the use of different digital technology tools (see Figure 6). Two out of three teachers stated 'Flexibility in adaptation for learners' and one 'Ease of use' as their choice for their implementation.

5.1.4.3 Contradictions

This activity identifies secondary contradictions. When asked about the role of different stakeholders in shaping digital pedagogy practices in the institution, participants stated that a tension between high expectations from managers and a lack of support leaves teachers under pressure. When asked about the support, all participants stated that due to the unavailability of professional development courses, they refer to students for feedback to help them shape their practice.

Figure 7. Activity System of digital pedagogy practices in Barbering, Hairdressing, and Beauty Therapy Department with identified primary and secondary contradictions



5.1.5 Activity system of the digital pedagogy practices in the Barbering, Hairdressing, and Beauty Therapy Department

5.1.5.1 Object of activity

Inclusive learning and ease of assessment tracking are the objects of this activity system.

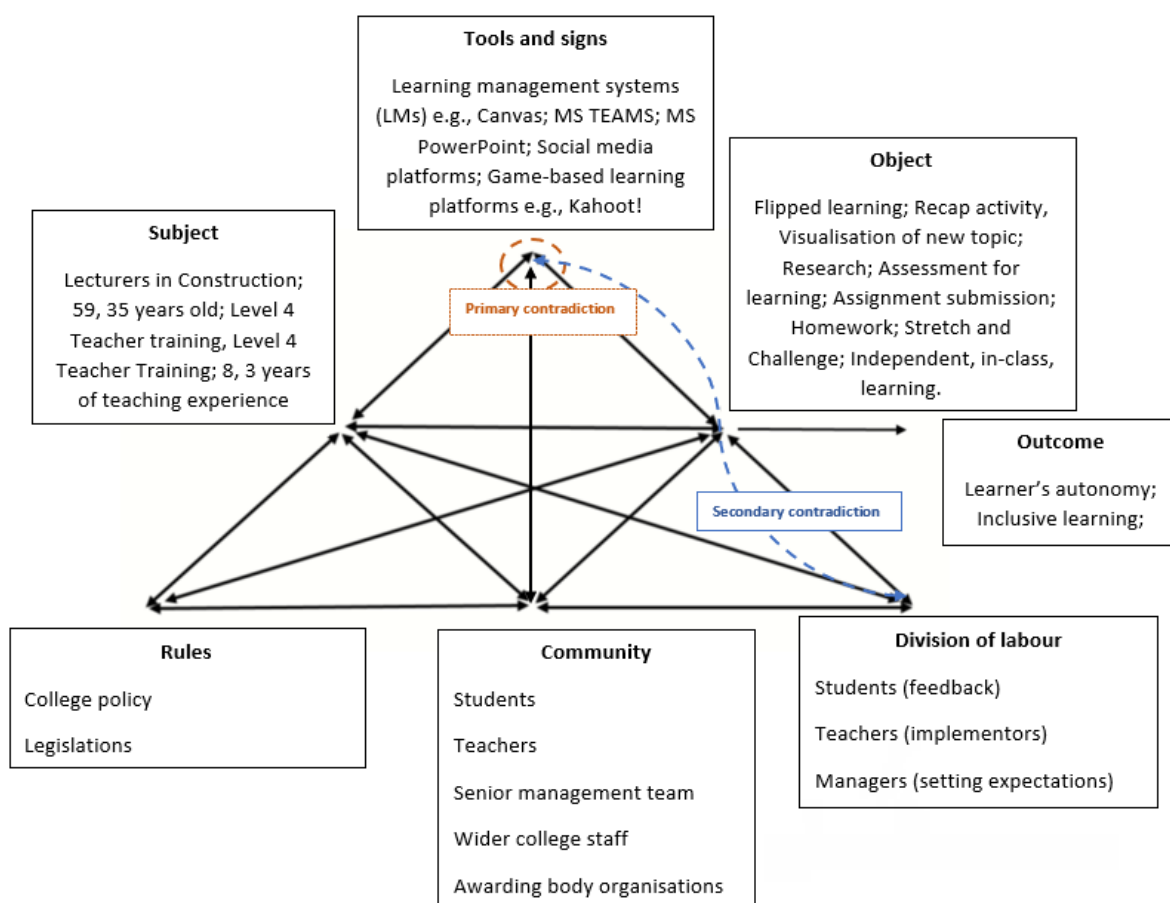
5.1.5.2 Implementation

Findings demonstrate the use of a range of tools (see Figure 7). Two out of three participants identified 'Learners' needs' and one 'Learners' preferences' as factors in deciding their implementation.

5.1.5.3 Contradictions

When asked about challenges in implementing digital pedagogy practice, one out of three participants stated 'Lack of support from managers', another 'Heavy workload in producing digital resources', and one 'Lack of developmental training' as the main challenges to their implementation—the given statements allowed for the identification of primary and secondary contradictions in this activity.

Figure 8. Activity System of digital pedagogy practices in Construction Department with identified primary and secondary contradictions



5.1.6 Activity system of the digital pedagogy practices in the Construction Department

5.1.6.1 Object of activity

'Learner's autonomy' and 'Inclusive practice' have been identified as the object of this activity system (see Figure 8).

5.1.6.2 Implementation

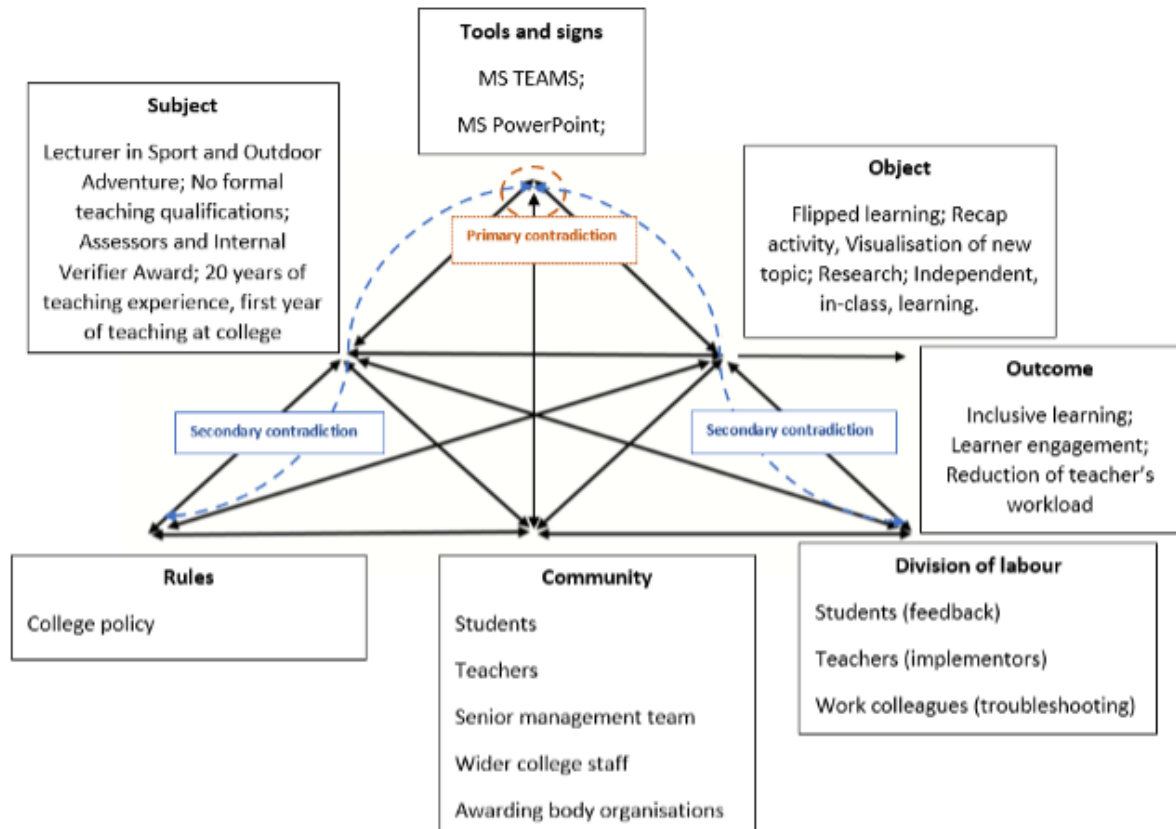
Findings show that a range of digital pedagogy tools are used in practice (see Figure 8). However, their implementation is restricted by their 'Accessibility', as one participant pointed out, and for another being 'Learner friendly' is their main point of judgment in implementing a digital tool.

5.1.6.3 Contradictions

When asked what support is in place to assist in the effective implementation of digital pedagogy tools, one out of two in this department stated that there is a 'Lack of specific learner support to assist with digital skills training'. However, another pointed out that 'There is support but keeping pace with different platforms is time-consuming'. The statements allow for identifying primary and secondary contradictions in this activity system.

Figure 9. Activity System of digital pedagogy practices in Sport and Outdoor Adventure Department with

identified primary and secondary contradictions



5.1.7 Activity system of the digital pedagogy practices in Sport and Outdoor Adventure Department

5.1.7.1 Object of activity

'Inclusive learning', 'Student engagement', and 'Reduction of teacher's workload' were identified as the object of this activity system (see Figure 9).

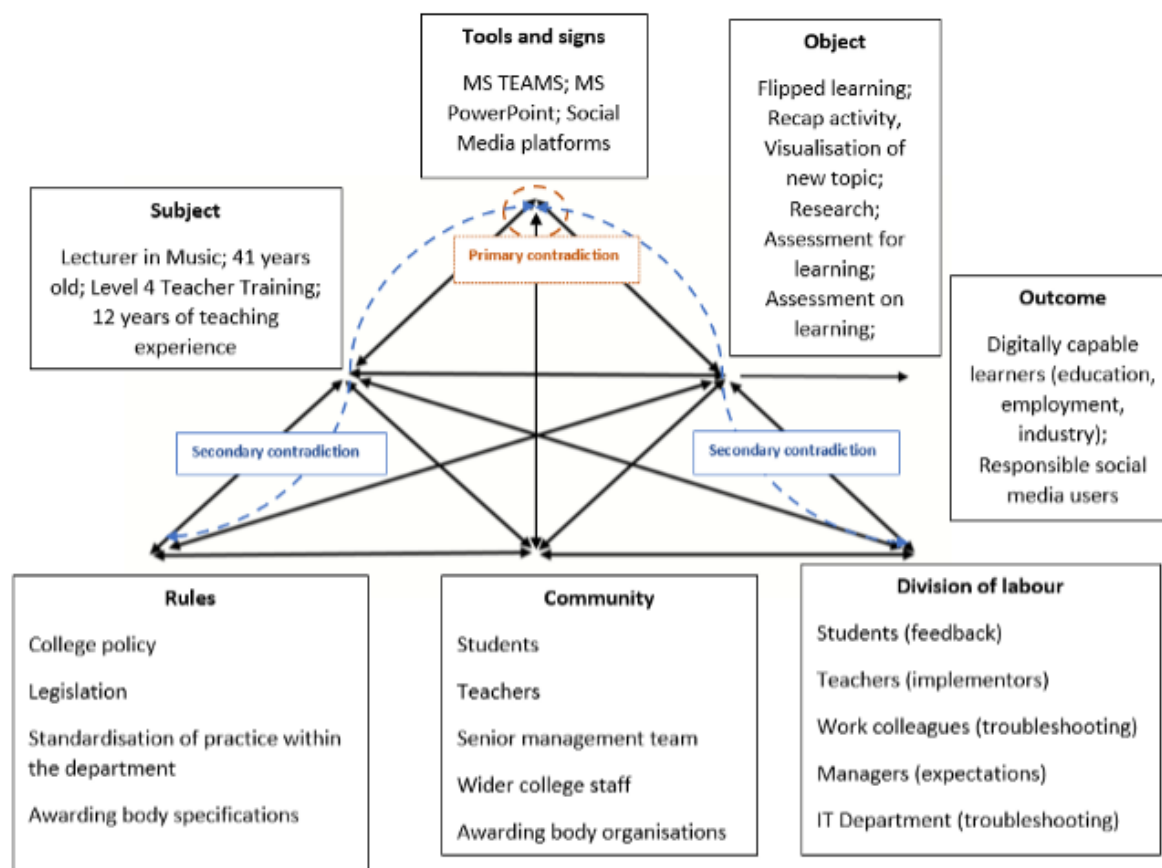
5.1.7.2 Implementation

When asked about their implementation, the participant responded that the tools they use are 'Easy to follow for me and my students', adding 'I tend to use what I am familiar with' and what follows College policy. Digital pedagogy practice was limited to just two tools which are encouraged for use by the institution (see Figure 9).

5.1.7.3 Contradictions

When asked about challenges, the participant stated, 'Limited interdepartmental peer support', and 'Not knowing whether is working' as the main sources of tension behind the implementation of digital technology in teaching and learning. Digital pedagogy practice was limited to just two tools considered compulsory to use by the institution (see Figure 9), therefore, in this activity system, both primary and secondary contradictions are identifiable.

Figure 10. Activity System of digital pedagogy practices in the Music Department with identified primary and secondary contradictions



5.1.8 Activity system of the digital pedagogy practices in the Music Department

5.1.8.1 Object of activity

Despite the limited use of institution-provided digital tools, with the use of social media platforms as educational tools (see Figure 10), 'Digitally capable in education and industry' and 'Responsible social media users' were identified as objects of this activity system (see Figure 10).

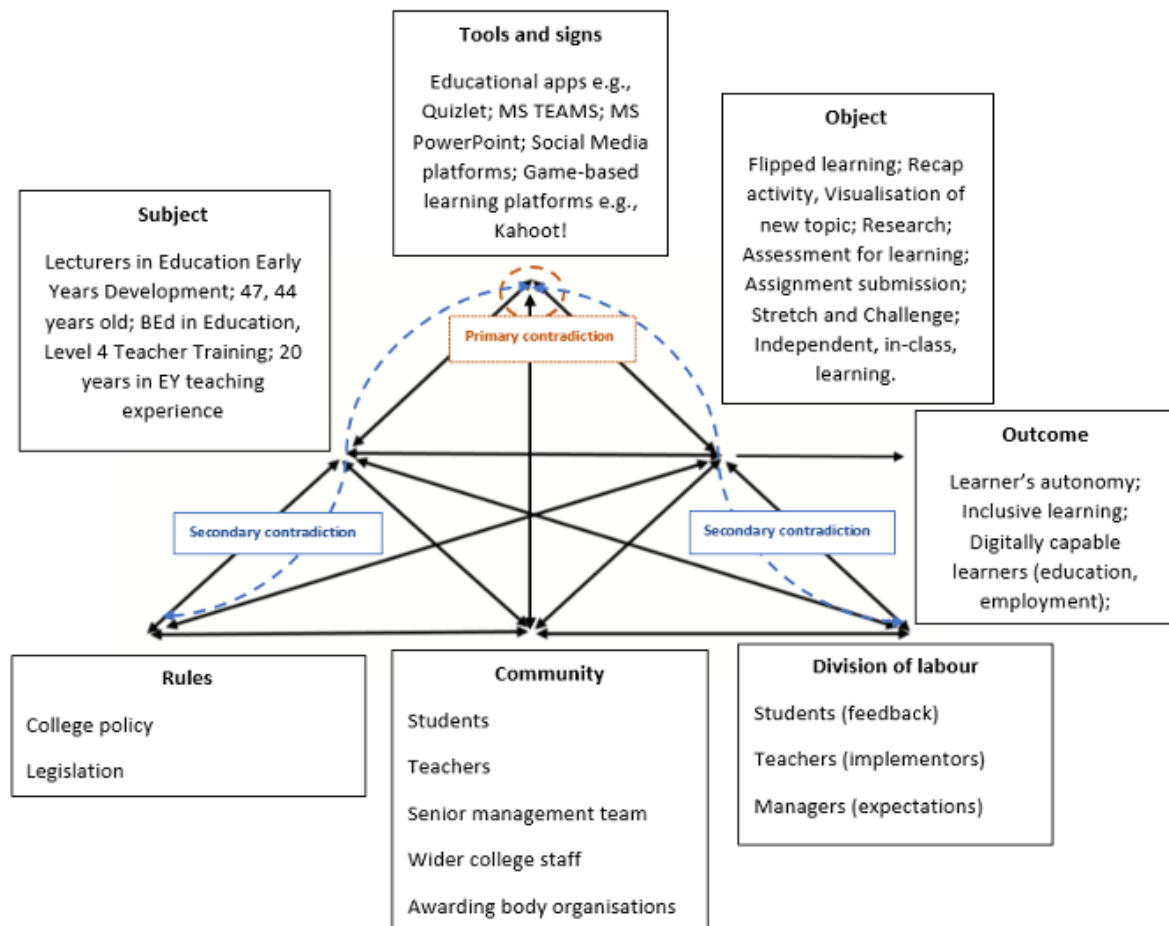
5.1.8.2 Implementation

When asked about the implementation, it was 'Lack of confidence' and 'Not knowing whether is working' but also 'Relatability to industry standard and practice' that determined the choices behind the digital technology and tools in pedagogy practice.

5.1.8.3 Contradictions

Although the participant stated support from the college IT team, the participant identified 'Loose curriculum' as a point of tension with 'Lack of collaborative professional development opportunities' as a main challenge affecting the effective implementation of digital pedagogy practices. This stimulates the rise of secondary contradictions as they occur between activity elements.

Figure 11. Activity System of digital pedagogy practices in Education and Early Years Department with identified secondary contradictions



5.1.9 Activity system of the digital pedagogy practices in Education Early Years Development Department

5.1.9.1 Object of activity

This activity system identifies 'Learner's autonomy', 'Digitally capable learners', and 'Inclusive learning' as its object.

5.1.9.2 Implementation

One participant stated that 'Ease of use' and another that 'Free access' with one adding a 'Lack of confidence' and other 'Difficult choices between technologies' as determinants in implementing digital pedagogy practices.

5.1.9.3 Contradictions

Secondary contradictions are identifiable in this activity system between the rules and tools as when asked about challenges one out of two participants stated that the use of certain technologies is 'decided by management'. For the second participant, it was 'little to no support in their implementation' or 'promotion of other more suitable, subject-oriented tools' which indicated the contradiction between the division of labour and the tools. For another participant, it was a 'lack of explicit professional development on digital pedagogy practices' with both agreeing that the 'workload is unevenly distributed with a heavy burden on the teachers.'

5.2 Cross-departmental digital pedagogy practice

5.2.1 Teachers' motivation to integrate ICT into their pedagogical practices as the object of the activity system

Detailed analysis of each *Departmental Activity System* demonstrated that teachers are aware of the positive educational, social, and socioeconomic benefits of implementing technology. Meeting learners' needs and providing an inclusive learning environment were predominantly stated as the object of the activity with only some (see Figures 5, 7, and 9) seeing digital pedagogy practice as also an ease to their workload.

5.2.2 Implementation of digital pedagogy practices

Analysis of departmental findings (see Table 2) demonstrated that most participants from across the departments implement a vast amount of digital pedagogy practices in their teaching and learning with only some (see Figure 3) purposefully limiting usage based on self-beliefs on its harming creativity.

Most of the implementation is strictly guided by the managerial expectations and availability of the tool or technology provided by the institution.

For participants 'Ease of use' (see Figures 3, 4, 5, 6, 9, 11), as well as 'Free access' (see Figure 4, 10), and 'Adaptability for learners' (see Figures 5, 6, 7, 8, 9), were identified as the main determinant in the implementation of digital pedagogy practices. However, College policy (see Figure 9), and 'Relatability to industry standards' (see Figure 10) were also mentioned in some cases. In addition to that, when asked to choose what are the main challenges to implementing digital pedagogy practices, 5 out of 9 participating departments stated 'Difficult choices between digital tools and technologies' (see Figure 5, 7, 8, 10, 11), alongside 'Lack of confidence' (see Figure 5, 6, 7, 11), and 'Not knowing whether is working' (see Figure 3, 4, 5, 6, 8, 9, 11). Interestingly, no one from participating departments have chosen 'Difference in opinion' as their determining factor.

5.2.3 Contradictions

Analysis of findings shows the range of systemic contradictions that arise within the elements of digital pedagogy practices activity and between its elements.

Digital tools and technologies used in digital pedagogy practices were identified as primary contradictions for every department (see Figures 3, 4, 5, 6, 7, 8, 9, 10, 11).

However, further analysis allowed differentiation between secondary contradictions explicit to each department with some commonalities shared across them.

For most activity systems in the study (see Figures 3, 4, 5, 6, 7, 8, 10, 11), secondary contradictions are triggered by institutional expectations for the implementation of preferable digital technology with some seeing the choice as not being the most subject specialism orientated (see Figure 10). However; 'Lack of professional development opportunities' (see Figures 4, 5, 6, 7, 8, 10, 11) is the main trigger of tension for most participants with some finding 'Limited encouragement for peer support and share of resources' (see Figures 9, 10) challenging.

'Difficult choices between digital tools and technology' (see Figures 4, 5, 8, 11), 'Lack of confidence' (see Figures 5, 10, 11), and 'Not knowing whether is working' (see Figures 5, 9, 10) are barriers that most teachers are left to face alone (see Figures 4, 5, 6, 7, 8, 9, 10, 11) resulting in relying on 'Learners' feedback' as the main guidance in effecting implementation (see Figure 5, 6, 7, 8).

6. Discussion

The literature review demonstrated a view of teachers' often deceptive beliefs about technology integration (Blin & Munro, 2008; Ross, Hogaboam-Gray, & Hannay, 2001), placing these at the forefront of the current debate on digital pedagogy practices. Previous studies have focussed on teachers' attitudes and emotions as meaningful stimuli motivating its implementation (Wood, Muller, Willoughby, Specht, & Deyoung, 2007), teachers' lack of confidence in technology applications (Karel, Acker, Vermeulen, & Buuren, 2013), or teachers' limited digital capabilities (Brun & Hinostroza, 2014), as a central barrier to successful digital pedagogy practice. However, the findings from this research allowed for a critique of the literature as views accentuating teachers' environment and practice as a complex social system have been insufficiently considered.

Table 2. Cross-departmental digital pedagogy practice

	Subject	Object	Outcome	Digital pedagogy	Primary contradiction	Secondary contradictions
Figure 3	Film Production Department	Introduction of the new topic	Ability to work in line with the evolving industry	Ease of use	Digital pedagogy tools	Institutional expectations for the implementation of preferable digital technology
		Research				
		Assignment submission				
Figure 4	HND Business Management Department	Lesson content	Student engagement	Ease of use	Digital pedagogy tools	Institutional expectations for the implementation of preferable digital technology
		Assessment for learning		Free access		Lack of professional development opportunities
		Stretch and challenge		Not knowing whether is working		Difficult choices between digital tools and technology
		Assessment on Learning				
Figure 5	Maths, English, and Functional Skills Department	Flipped learning	Enhancement of learning opportunities	Ease of use	Digital pedagogy tools	Institutional expectations for the implementation of preferable digital technology
		Recap activity	Individualised assessment	Adaptability for learners		Lack of professional development opportunities
			Student engagement			
		Visualisation of new topic	Release of workload	Lack of confidence		Difficult choices between digital tools and technology
		Assessment for learning	Learner's achievement	Not knowing whether is working		Lack of confidence
		Assessment on Learning				
		Homework				
		Independent in-class learning				

Table 2. (cont.) Cross-departmental digital pedagogy practice

	Subject	Object	Outcome	Digital pedagogy	Primary contradiction	Secondary contradictions
Figure 6	Professional Services and Care Department	Flipped learning	Learner engagement	Ease of use	Digital pedagogy tools	Institutional expectations for the implementation of preferable digital technology
		Recap activities	Learning content aligned with contemporary needs	Adaptability for learners		Lack of professional development opportunities
		Visualisation of the new topic	Inclusive learning	Lack of confidence		
		Research	Flexible learning	Not knowing whether is working		
		Assessment for learning				
		Assignment submission				
		Homework activities				
		Stretch and challenge activities				
		Independent in-class learning				
Figure 7	Barbering, Hairdressing, and Beauty Therapy Department	Flipped learning	Inclusive learning	Lack of confidence	Digital pedagogy tools	Institutional expectations for the implementation of preferable digital technology
		Recap activities	Easy assessment tracking			
		Visualisation of the new topic				
		Research activities				
		Assessment for learning				
		Assignment submission				
		Stretch and challenge activities				
		Independent, in-class learning				

Table 2. (cont.) Cross-departmental digital pedagogy practice

	Subject	Object	Outcome	Digital pedagogy	Primary contradiction	Secondary contradictions
Figure 8	Construction Department	Flipped learning	Learner’s autonomy	Adaptability for learners	Digital pedagogy tools	Institutional expectations for the implementation of preferable digital technology
		Recap activities				
		Visualisation of the new topic				
		Research activities				
		Assessment for learning				
		Assignment submission				
		Stretch and challenge activities	Inclusive learning	Not knowing whether is working		Lack of professional development opportunities
		Independent, in-class learning				
Figure 9	Sport and Outdoor Adventure Department	Flipped learning	Inclusive learning	Ease of use	Digital pedagogy tools	Limited encouragement for peer support and sharing of resources.
		Recap activities		Adaptability for learners		
		Visualisation of the new topic	Student engagement	College policy		
		Research activities	Reduction of teacher’s workload	Not knowing whether is working		
		Independent, in-class learning				
Figure 10	Music Department	Flipped learning	Digitally capable learners (education, employment, industry)	Free access	Digital pedagogy tools	Institutional expectations for the implementation of preferable digital technology with the choice as not being the most subject specialism orientated
		Recap activities				
		Visualisation of the new topic				
		Research activities				
		Assessment for learning				
		Assessment on Learning				
		Assignment submission				
		Stretch and challenge activities	Responsible social media users	Relatability to industry standards		Lack of professional development opportunities

Table 2. (cont.) Cross-departmental digital pedagogy practice

	Subject	Object	Outcome	Digital pedagogy	Primary contradiction	Secondary contradictions
Figure 11	Education and Early Years Department	Flipped learning	Learner's autonomy	Ease of use	Digital pedagogy tools	Institutional expectations for the implementation of preferable digital technology
		Recap activities				
		Visualisation of the new topic				
		Research activities	Inclusive learning	Lack of confidence		Lack of professional development opportunities
		Assessment for learning	Digitally capable learners (education and employment)	Not knowing whether is working		Difficult choices between digital tools and technology
		Assignment submission				
		Stretch and challenge activities				
		Independent, in-class learning				

Furthermore, literature has evidenced that it is widely accepted that to remain relevant education needs to be transformed through the use of technology (Lewin, Cranmer, & McNicol, 2018), but to achieve this the pedagogical practices require reconsideration (Beetham & Sharpe, 2020), enabling the facilitation of a refreshed set of digital pedagogy competencies (Rawat, Tiwari, Sharma, & Chatterjee, 2022). However, findings from this research demonstrated that digital practice is established although limited. Moreover, it has shown that teachers are aware of the positive educational, social, and socioeconomic benefits of the implementation of technology and are committed to the use of a variety of mediating digital pedagogy tools to achieve their desired outcomes.

Unlike sociocultural theories which focus on action rather than activity (Wertsch, 1991), an activity-theoretical standpoint sees human beings as situated in a collective life perspective, in which they are driven by purposes that lie beyond an immediate goal (Sannino, Daniels, & Gutierrez, 2009). This methodological contrast of the unit of analysis allows to consider historical continuity by placing object-oriented activities as its core enabling to conceptualise actions in the broader perspective of motivational and systemic context. The use of the activity system (Engeström, 1987) as

a unit of analysis in this study allowed to highlight the tension raised by the connection between teachers' commitment to implementing digital pedagogy practice and institutional expectations for the implementation of preferable technologies without adequate institutional support.

As contemporary pressures for digitalisation in education raise increased needs for teachers' support through continuing professional development, an explicit focus on digital pedagogy practices increases in parallel. Moreover, this study's findings bring a new perspective and add to the literature as it demonstrates that teachers themselves are highly motivated to implement digital pedagogy in their practice but are in constant flux with interinstitutional limitations. However, regardless of the range of experienced tensions, teachers place learners' educational, social, and socioeconomic needs at the centre of their digital pedagogy practice and continue to innovate their digital pedagogy practice as more mediating tools become available. This finding can be articulated as a historic, emergent and systemic phenomenon, manifested as a construction of a significantly developmental contradiction (Sannino & Engeström, 2018), and can serve as a starting point for the process of tracing its historical development in the study of change.

7. Conclusion

The use of principles of Cultural-Historical Activity Theory, to map the activity system within a general further education college, allowed for an explicit conceptualisation of digital pedagogy practices across post-16 sector teaching and learning. Moreover, this approach enabled a holistic analysis of the case study question by simultaneously considering participants as individuals and as integral parts of the multi-mediational activity systems of their immediate and wider social practice. The findings highlighted the interinstitutional tensions caused by professional commitment to deliver teaching and learning that meets learners' and wider societal needs and a range of individual and shared challenges that originate from the various elements that underpin social practice.

Activity systems are in constant instability due to the tensions and negotiations among different elements. However, to address and build on these case study findings, further research on how teachers can access a wider repertoire of mediational means that will support overcoming contradictions in their digital pedagogy practices is recommended. Moreover, the establishment the contours of such disturbances, between the classic heritage of the institutional practices and the challenging possibilities of societal change, gives a ground for the future design and implementation of transformation through interventionist research methods, including those developed within the Cultural-Historical Activity Theory framework, to pursue change in organisational settings and expansive learning.

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