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Exploring the teacher's role amid rising generative AI: An activity theory analysis in further education

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Abstract

Generative AI (GenAI) is changing education by reshaping teacher roles and pedagogical methods. This study examines its impact on classroom interactions through an activity theory lens, highlighting the balance between GenAI's benefits and the human aspects of teaching. Using a qualitative multiple case study approach, it explores how ChatGPT and TeacherMatic influence teachers' roles, pedagogical strategies, and classroom dynamics. Findings indicate that while GenAI improves personalised learning and administrative efficiency, it remains a complementary tool rather than a replacement for human mentorship and expertise. The study emphasises GenAI as an educational innovation that implants proven pedagogy, improving instructional efficiency while preserving essential human elements. These insights call for policy-makers and technology-enhanced learning researchers to develop frameworks that optimise GenAI's benefits without compromising holistic educational practices.

1. Introduction

Generative artificial intelligence (GenAI) is reshaping the workplace, and the education sector is no exception (Luckin and Holmes, 2016). This study addresses the challenging question regarding how GenAI will impact the role of teachers and pedagogy as educators integrate this technology into practice using activity theory. On the one hand, Edwards and Cheok (2018) advocate the creation of robotic personalities capable of autonomous teaching functions. This school of thought suggests that it is only a matter of time before robots replace teachers. On the other hand, Selwyn (2019) challenges this view, arguing that while AI and robotics are transforming education, they cannot fully replace human teachers. Pedro et al. (2019) claim that GenAI can transform every aspect of our social interactions. The technology demonstrates its capabilities by creating new educational tools and methods (Tapalova and Zhiyenbayeva, 2022). Previous research highlights the prospects for improved efficiency, customisation, and education accessibility from GenAI integration (Baidoo-Anu and Owusu Ansah, 2023). This research explores how GenAI reshapes the teacher's role and pedagogical approaches amidst changing classroom interactions in the contemporary United Kingdom's further education sector.

In a recent staff meeting, the researcher noted varied reactions to GenAI tools in student assessment. One teacher expressed enthusiasm for GenAI's potential, while another worried about contract breaches, as teachers should 'personally' grade students. These differing views underscore the need to understand GenAI's impact on teaching roles. GenAI is creating new opportunities that require compatible pedagogical approaches (Noroozi, Soleimani, Farrokhnia, & Banihashem, 2024). As it integrates into education, these opportunities have become increasingly important (UNESCO, 2019; Pedro et al., 2019). Understanding these dynamics is key to creating pedagogical approaches that balance GenAI benefits with human elements (Tillmanns et al., 2025). Prior research explores how GenAI reduces teachers' burdens by automating repetitive tasks, allowing them to focus on pastoral duties (Fassbender, 2024). AI's role in personalised learning, transforming teaching approaches through tailored plans and intelligent tracking, is well-documented (Chen, Chen, & Lin, 2020). Additionally, it can create study materials and deliver content, redefining teachers' roles (Koh, Cowling, Jha, & Sim, 2022). These previous studies have explored the implications of GenAI in education (Malik et al., 2023), without adequately addressing the gap in understanding how the integration of GenAI technologies impacts pedagogical approaches and practices

in further education. Technology-enhanced learning (TEL) research needs an in-depth understanding of how these technologies impact teachers' roles in practice and their respective implications on pedagogy. This research contributes to the existing TEL literature by providing insights into this understudied area.

The debate on AI replacing or augmenting teachers' roles emphasises the need for further research on effective integration strategies (Aleryani, 2019; Huang & Rust, 2018; Pavlik, 2023). Gaps persist in understanding the long-term effects of AI on the teacher's role, the nature of changes to the classroom activity system, and practitioner perspectives on the said transformation in pedagogy. Understanding the impact of AI on teachers' roles is crucial for educators (Holmes, Bialik, & Fadel, 2019). However, prominent studies exploring GenAI in education are from AI developers (Celik et al., 2022), indicating a need for teacher-based perspectives in TEL research. Effective teaching relies on the teacher's ability to apply suitable pedagogical techniques (Tondeur et al., 2020), especially when the structure of their work is redefined by emerging technology. GenAI might 'challenge existing pedagogies' (Holmes, Bialik, & Fadel, 2019).

Scholarly discourse touts GenAI as revolutionary (Prather et al., 2023). Researchers suggest that GenAI is replacing teachers or diminishing their role, rather than supporting more effective teaching (Holmes, Bialik, & Fadel, 2019). The motivation for this study is the perplexity that teachers' employment contracts stipulate that educators perform duties such as student assessment personally. However, leaders expect them to integrate GenAI for the same purpose without supporting employment contract-specific guidelines. The practitioner-researcher believes in teacher-aided evaluation of the pedagogical approaches that GenAI employs when 'replacing' teachers. TEL research must examine the extent of this 'replacement' in the teaching process to comprehend the implications of these changes on the teacher's work in changing classroom activity systems.

While integrating GenAI like ChatGPT and TeacherMatic into education has elicited varying opinions, teachers must assess their impact on pedagogical approaches in further education as their contribution to TEL studies. Using activity theory, the researcher, a practising educator at a further education institution in the United Kingdom, explores the effects of GenAI on teaching roles to help teachers, TEL researchers, and policymakers prepare for a GenAI-centric future in education. To attain this understanding, this study focuses on the following research question.

- RQ: How does integrating GenAI technologies in education impact the teacher's role and pedagogical approaches?

The specific objectives of this study are to examine how the integration of GenAI technologies impacts pedagogical approaches and practices in further education; analyse the implications of GenAI integration for teacher roles and classroom interactions and provide additional insights into understanding the role of teachers amidst technological advancements in further education.

In this paper, the investigator synthesises existing literature and adopts a qualitative multiple-case study approach, focusing on ChatGPT and TeacherMatic-mediated instances to explore the GenAI phenomena in education. Data were analysed through an activity theory lens, to examine the changing interactions within the teaching-learning process facilitated by these technologies. As an insider, my position and experience within the education institution provide unique access to data, deeper contextual understanding, and stronger rapport with participants, improving the study's depth. However, this role also introduces potential biases (Toy-Cronin, 2018), requiring reflexivity and strategies to maintain objectivity, such as triangulation and transparent documentation (Greene, 2014).

2. Literature review

This literature review begins with a brief excursion on the literature search process before exploring the developing influence of GenAI in education. Focus is on personalised learning, GenAI's potential to replace teachers, and the irreplaceability of human educators. It highlights the need to investigate how GenAI reshapes classroom interactions, the role of teachers, and pedagogical practices. The selected themes reflect an area of debate in TEL that explores the impact of GenAI on educational practices.

2.1 Literature search process

Figure 1 summarises the literature search process.

The researcher explored and assessed twenty-two articles from four databases, including Scite, Google Scholar, ERIC, and OneSearch. At the outset, the scholar found 5,274 results from the search, featuring respective contributions from Scite (2,886), Google Scholar (2,290), OneSearch (35), and ERIC (63). Included in this review were peer-reviewed articles with publication dates confined to 2013-2024. Key search terms included education, technology, generative

artificial intelligence (AI), and human-computer interaction readings. The investigator made exceptions for older dates to gain clarity from pioneering works by eminent authorities in the history and future of workplace automation, the use of, and the implications of GenAI in education. They excluded articles that lacked data, methodological rigour, relevance, validity, full-text access, language compatibility, and alignment with research objectives.

2.2 Impact of GenAI on education

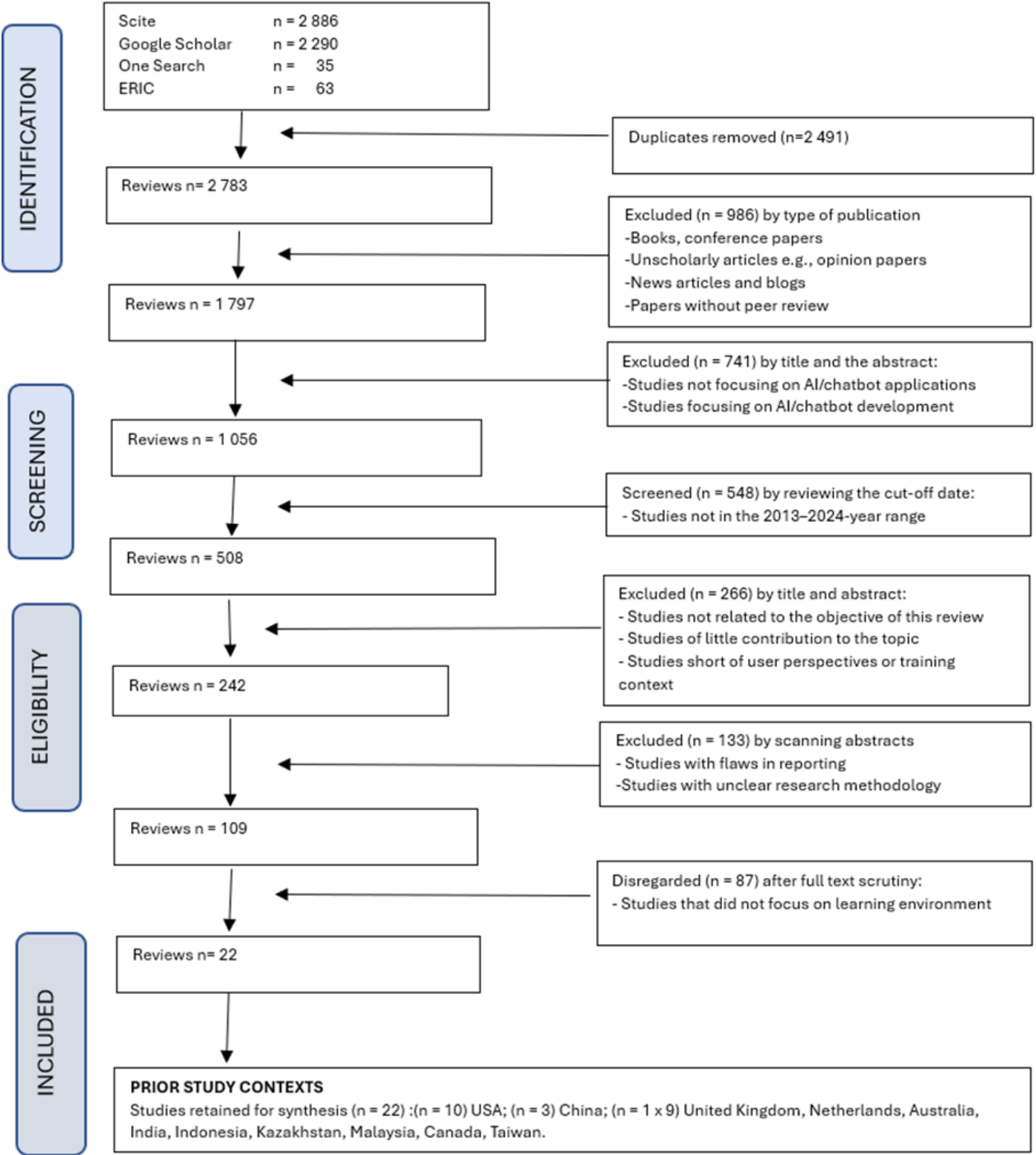
2.2.1 Personalised learning

One prominent theme from the literature is the benefit of personalised learning from GenAI. Scholars suggest that GenAI reduces teachers' burdens by automating repetitive tasks, enabling more focus on nurturing students (Fassbender, 2024). While AI facilitates personalised learning and allows tailored plans for individual needs (Chen, Chen, & Lin, 2020), there is scant work on over-reliance on technology, potentially underestimating the role of the human teacher. AI's capability to simulate personalised tutoring interactions raises concerns about the authenticity and depth of human connection (van der Vorst & Jellicic, 2019; Liu, Saleh, & Huang, 2021). GenAI enhances learning through big data analysis and personalised guidance (Baidoo-anu & Owusu Ansah, 2023; Luan et al., 2020; Chou et al., 2022). These studies neglect how the data-centric approach to TEL stimulates students' affective, social, psychomotor, and spiritual development. It is unclear how GenAI performs these aspects of pedagogy like live teachers. GenAI promotes educational equity by bridging regional differences and offering remote personalised teaching (Alasadi & Baiz, 2023; Tapalova & Zhiyenbayeva, 2022; Chen, Chen, & Lin, 2020). Nevertheless, this assumes equal access to technology, which is not always available, potentially exacerbating inequalities. While AI enables high-quality education and professional development in remote areas (Rios-Campos et al., 2023), robust internet infrastructure remains significant. Current academic discourse barely addresses the teacher's shifting role in a changing classroom from the practitioners' perspectives.

2.2.2 GenAI's potential to replace teachers

Scholars argue that the growing use of humanoid robots in classrooms will impact teachers' traditional roles and professional identities (Newton & Newton, 2019). Reich-Stiebert and Eyssel (2016) highlight teachers' concerns and fear that robots might replace teachers and classroom interpersonal relationships. There is a need, however, to

Figure 1. Search strategy: PRISMA format used



conduct large-scale studies that scrutinise changes in classroom systems, interactions, and holistic pedagogy. While GenAI can develop study materials and deliver course content (Koh, Cowling, Jha, & Sim, 2022), its impact on the holistic educational environment remains under-researched. The McKinsey Global Institute (2017) predicts that about half of contemporary jobs could become automated by 2055. Teaching is among these vocations. This sounds plausible given the capabilities of GenAI systems like ChatGPT and TeacherMatic. Yet, this prediction is speculative and does not account for the subtle, interactive nature of teaching. Pranger and Su (2023) explore AI's effects on high-salaried professional roles, noting that highly educated employees are particularly vulnerable. Nonetheless, they do not provide substantial evidence supporting the replacement of teachers in classrooms. The absence of empirical studies examining the removal of teachers from classrooms weakens these arguments. The researcher, an experienced practitioner, contends that TEL research needs to analyse GenAI-driven classrooms focusing on the role of human teachers. Only then can scholars substantiate the view that GenAI can supplant teachers. The complexities of pedagogical interactions and the critical importance of human elements in education need detailed exploration.

2.2.3 The irreplaceability of teachers

A contrasting viewpoint maintains that although GenAI will replace professional jobs, thinking GenAI will replace workers' jobs is a myth (Aleryani, 2019). Researchers point out that human control and supervision remain essential, and AI creates new employment opportunities (Huang & Rust, 2018). As with past technological advancements, jobs disappear while others emerge, requiring different skill sets, which are now more accessible due to widespread familiarity with technology (Autor, 2015). With proper attention to AI skills and qualifications, the future promises a better life and support, dispelling the 'myth' of job replacement by AI (Chui, Manyika, & Miremadi, 2016). The irreplaceability of teachers lies in their knowledge, expertise, experience, and commitment to students, which no system can supplant (Nur Fitria, 2023). Despite that, these perspectives miss the challenges of integrating GenAI into the classroom without official guidelines. They ignore the need to explore practical ways to harmonise GenAI with existing educational processes. This obscures the critical insights associated with interdisciplinary research that grasp GenAI's pedagogical impact. The changing role of the teacher remains inadequately addressed, leaving a gap in understanding the true potential of GenAI in education.

This study appreciates that GenAI holds promise for improving learning outcomes and easing teachers' work. However, the scholar explores how GenAI integrates into the classroom activity system, and its impact on the teacher's role, pedagogy, and classroom interactions. While GenAI automates tasks, scholars should clarify how it substitutes teachers when it complements them. This research explores how GenAI integrates into the classroom activity system, and its effects on pedagogics, and classroom interactions.

2.2.4 Contribution to knowledge

The scholar explores how GenAI integrates into classroom activity systems and how this potentially affects the role of human teachers. Emphasis is on addressing the gap in pedagogical implications during the holistic development of students. While current TEL literature highlights GenAI's potential and risks, it inadequately explores the complex roles of teachers in GenAI-driven environments. This research seeks to fill this gap by examining the practical impacts of GenAI on the teacher's changing role in classroom interactions, pedagogy, and the relationship between GenAI and human elements in fostering comprehensive educational experiences. Understanding these interactions is significant for GenAI integration in education. The specific research question to help with this understanding concerns how integrating generative (GenAI) technologies impacts teaching roles and the pedagogical approaches and practices in education.

3. Philosophical perspectives

The researcher's stance on this topic stems from experience as an educator and professional engagement with educational technology. Witnessing firsthand how technological advancements transform the classroom, the researcher believes in the potential of GenAI technologies like ChatGPT and TeacherMatic to reshape education. Viewing the world as an interconnected activity system shaped by social and cultural influences, the researcher adheres to the socio-cultural paradigm, acknowledging the impact of culture, history, and social interaction on human development. As an advocate of activity theory, the researcher explores the changing role of teachers with GenAI integration. This perspective allows for a detailed analysis of shifting classroom practices, offering insights into the complexities of GenAI integration and its impact on teaching and learning (Herod, 1999; Vygotsky, 1978; Leontiev, 2005; Engeström et al., 2014; Kaptelinin and Nardi, 2018; Mwanza, 2011).

4. Theoretical framework

In this multiple case study, the researcher uses activity theory as a tool of analysis. Each case shares similarities in social and cultural mediation but differs in technological mediation. The first case examines a classroom activity system where learning activities are mediated by ChatGPT. In the second case, a classroom activity system mediated by TeacherMatic is explored. Both cases analyse how these GenAI tools shape teaching and learning dynamics. The activity system is used as the unit of analysis in Cultural-Historical Activity Theory (CHAT), focusing on its components and the analysis of contradictions within educational settings (Núñez, 2014).

Activity theory aligns with this study as it examines activity systems and contradictions, consistent with Yin's (2003) view of case studies exploring contemporary phenomena within real-life contexts (Murphy and Rodriguez-Manzanares, 2008). The researcher views the classroom as an activity system (Gedera, 2014). It can be conceptualised to understand and analyse its intertwined components and interactions (see Figure 2 for an activity system). The classroom activity system is complex, with different elements interacting to shape the educational experience (Nussbaumer, 2012). Cultural-Historical Activity Theory (CHAT) provides a lens to analyse these interactions by examining how subjects, tools, rules, and community dynamics mediate learning and drive systemic change (Yamagata-Lynch, 2010).

4.1 The rationale for using activity theory

The researcher adopts activity theory to address the contextual situation (Bligh and Flood, 2017). This study positions ChatGPT and TeacherMatic as case studies within the phenomenon of GenAI in education. The researcher explores how GenAI technologies could change education and the teacher's role by addressing contradictions within the classroom system (Yamagata-Lynch, 2010). While GenAI enables innovative learning methods and enhanced outcomes, entrenched cultural and historical practices may resist change. These advancements could render current pedagogical practices obsolete, necessitating prompt adaptation. This conflict implies the need for modification, improvement, or retention of practices, depending on the shift toward a new educational paradigm where students engage in GenAI-backed self-directed learning. Activity theory helps understand how new learning technologies affect practice (Jonassen & Rohrer-Murphy, 1999), aligning with the

focus of this research (Gibbes & Carson, 2014). Also, Uden and Ching (2024) argue that adopting Activity Theory as a foundational framework for GenAI design can facilitate the creation of dynamic and engaging learning experiences.

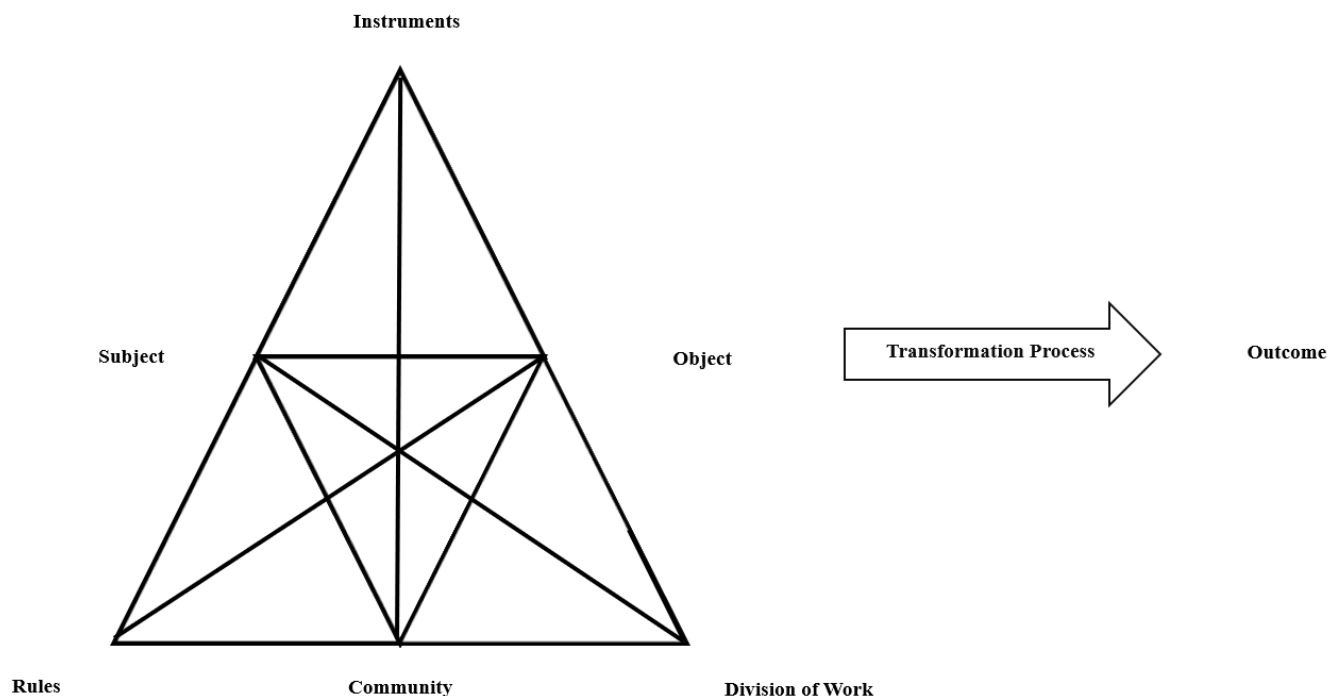
4.2 Principles of activity theory

The history of activity theory begins with the work of Vygotsky (1978) who formulated the mediational triangle model consisting of subject, object, and tools for psychological development (Zittoun et al., 2007). Engeström (1987) clarifies the theory by incorporating the division of labour, rules, and community, as the auxiliary components to the original triad (Ditsa, 2003). Koszalka (2004) underscores that these six elements constitute the analytical unit within the socio-historical framework. This functions at personal and communal tiers (Wenger, 1998; Prenkert, 2010). Activity theory offers an interdisciplinary lens through which to analyse phenomena (GenAI) within the human sciences, integrating insights from psychology, sociology, anthropology, and other disciplines to understand the complexities of human behaviour and social dynamics (Blunden, 2010). Figure 2 depicts the structure of an activity system according to Engeström (1987).

Activity theory posits that tools and social contexts shape human activity aimed at achieving specific goals. The concept of an object represents the purpose guiding behaviour toward these goals. Subjects include individuals and groups working collaboratively to reach common objectives. Tools mediate human activity through physical instruments and conceptual frameworks. The community situates activity within its social and cultural context, influencing practices. Rules govern behaviour with explicit or implicit guidelines, while the division of labour assigns responsibilities within the community. Contradictions are structural tensions driving disturbances and innovations in activities (Engeström, 2001).

4.3 Previous applications of activity theory in education

The scholar aligns with other TEL researchers who regard activity theory as a valuable lens for analysing classroom activity systems (Liebenberg, 2014). Its use in similar contexts has gained wide recognition. Researchers such as Blackler, Engeström, and Leontiev employ it to analyse educational practices, from understanding collaborative learning environments to examining teacher-student interaction dynamics (Lin, 2007; Liu et al., 2022; Storch and Sato, 2020).

Figure 2. Adaptation of Engeström's (1987, p. 78) structure of an activity system

Jaworski and Potari (2009) use activity theory to explore the sociocultural complexity of mathematics teaching. This paper draws on activity theory's connections between mediating factors and activities (Jonassen and Rohrer-Murphy, 1999), focusing on its alternative and innovative aspects (Engeström, 2014). It emphasises collective competencies over fixed power structures and recognises the tensions and uncertainties in learning due to technological changes (Blackler et al., 2000; Blin and Munro, 2008). Its multilevel nature allows researchers to address context, situation, and practice within a unified framework (Nardi, 1996).

4.4 Approach to applying activity theory in this study

In this paper, the researcher adopts activity theory to analyse the impact of GenAI (ChatGPT and TeacherMatic) on teachers' roles and pedagogical practices. This framework helps map objectives driving GenAI integration, clarifying roles and interactions in the classroom, and emphasising how GenAI tools mediate these interactions. It provides insights into the institution's social context, norms, and division of responsibilities, identifying contradictions and tensions to inspire innovation and change. This research uses the Activity-Oriented Design Method (AODM), devel-

oped by Daisy Mwanza-Simwami. It is a framework used to analyse and characterise learner experiences with technology (Mwanza-Simwami, 2011). It focuses on understanding learners' practices and interactions with technology in educational settings. For example, AODM can be used to study how students collaborate and share educational resources in e-learning environments. In this study, AODM, an activity theory-based model, is used to create research questions, generate relevant interview questions, and refine views on deploying ChatGPT and TeacherMatic. The questions engage teachers in discussing GenAI-supported practices, identifying role changes, and analysing shifting classroom interactions. The study documents the changes in teacher roles, classroom interactions, and contradictions, illustrating technology's impact on education (Yamagata-Lynch, 2003; Karanasios et al., 2018). These changes could foster a new self-directed learning model (Murphy & Rodríguez-Manzanares, 2013) and support technology integration (Lim and Hang, 2003). The study focuses on the teacher's role with GenAI-aided tasks, classroom interactions, pedagogical practices, and contradictions. It aims to characterise GenAI's impact from teachers' perspectives. This approach is like that used by Greenhow and Belbas (2007) in seeking to understand collaborative knowledge-building in distance education.

5. Research design

This study employed a qualitative approach within a sociocultural paradigm to explore two generative artificial intelligence mediated classroom activity systems. One case examines a classroom activity system in which learning activities are mediated by ChatGPT, while another investigates a classroom activity system where learning activities are mediated by TeacherMatic at a college. Focusing on two implementations of these GenAI tools within the insider researcher's institution, interview questions were developed guided by Mwanza's Activity-Oriented Design Methodology (AODM), Mwanza-Simwami (2011). These questions were administered to a purposeful sample of fifteen teachers, from whom data were collected through interviews, observations, and document analysis. Throughout the process, the scholar strictly followed ethical research standards (Mack, 2005). They employed activity theory as the lens of analysis for comprehensive data interpretation iteratively.

As an insider, the investigator faced opportunities and challenges, recognised within the insider research scholarship (Mercer, 2007). While insider research offers deeper insights due to the researcher's familiarity with the context, it also poses challenges regarding objectivity and bias (Fleming, 2018). This dual awareness informed the researcher's approach to data collection and interpretation.

Socio-cultural theorists assert that social interactions, cultural contexts, and the use of language and tools profoundly influence human development and learning (De Valenzuela, 2014). This perspective aligns with the activity theory framework, which helped understand the interactions and changes within classroom activity systems with teachers using ChatGPT and TeacherMatic (Gedera, 2014; Nussbaumer, 2012). It enabled the researcher to capture insights on changing teacher roles and interactions through practitioner interviews. Activity theory helped to explore real-life contexts regarding contemporary phenomena, (Brown, 2008).

Using multiple case studies—one mediated by ChatGPT and the other by TeacherMatic, the scholar investigated how integrating GenAI shaped the classroom activity system, the teacher's role, pedagogy, and ensuing contradictions. According to Yin (1984, p. 1), the case study is “the preferred strategy for investigating ‘how’ or ‘why’ questions when the investigator has little control over events, and when the focus is on a contemporary phenomenon (GenAI) within a real-life context.” This method allowed the scholar to study real-life phenomena (ChatGPT and TeacherMatic) in depth, improving data variability and providing access to different

resources (Halkias et al., 2022). Yin's (2003) endorsement of case study research facilitated the exploration of GenAI within an authentic context (the researcher's further education institution).

Specifically, activity theory supported the identification of components of the classroom activity system: teachers (subjects), GenAI tools (mediating artifacts), and student learning objectives (objects) (Roth, 2004; Hardman, 2008; Kain & Wardle, 2014). This focus guided the design of interview questions and observation protocols that addressed how these elements interacted and influenced each other. Lesson observations and practitioner interviews helped identify and map student learning as the objective (object) driving the integration. The outcome of these GenAI-supported environments consisted of applying effective pedagogy. For instance, observation protocols captured interactions between teachers and students and noted the use of ChatGPT and TeacherMatic. Interview questions aided the exploration of teachers' perceptions of their changing roles and the pedagogical implications of integrating these tools.

Activity theory clarified roles and interactions within the classroom activity system, highlighting how ChatGPT and TeacherMatic mediated these interactions. The researcher's analysis of interview data revealed specific ways teachers adapted instructional strategies to incorporate GenAI tools, altering traditional teaching roles. They also observed and recorded how these tools reshaped classroom environments. The scholar then interacted with ChatGPT and TeacherMatic for the study.

5.1 Participants

The study aimed to investigate the impact of GenAI on teacher roles, classroom activity systems, and pedagogical implications by recruiting participants who had been using ChatGPT and TeacherMatic for at least three months. A purposeful sample was drawn from an in-house online training session about using ChatGPT and TeacherMatic. This ensured participants had sufficient experience to provide meaningful insights. Fifteen teachers were recruited after approaching thirty-two professionals. Two were female (13%) while thirteen were male (87%). All had at least three months of using GenAI. The average ages were thirty-two for males and twenty-six for females. Two male teachers taught one-hour lessons each under observation. The anonymised participants taught different courses in humanities, social sciences, and STEM. These were recruited from the institution's two campuses to ensure different perspectives (Dahal, 2023). Their teaching experience varied, with some early-ca-

reer educators and others having decades of experience in education. This range allowed for broader applicability of the findings while safeguarding confidentiality (Corti, Day, & Backhouse, 2000). Such an approach aligned with ethical research commitments and protected participant identities. This focused selection aligned with research objectives (Carr, 1994) and enabled deeper exploration of GenAI, with the sample size informed by data saturation (Miles & Huberman, 1994). Participants shared perspectives on how ChatGPT and TeacherMatic influenced teaching roles and pedagogical practices (Mahoney & Goertz, 2006).

5.2 Data collection

Following Creswell (2002), the scholar conducted qualitative interviews with fifteen teachers. Open-ended data collection through interviews captured naturalistic data from participants' responses and observations (DiCicco-Bloom & Crabtree, 2006), providing rich insights into their experiences with ChatGPT and TeacherMatic. Data were gathered from multiple sources, ensuring validity through converging lines of inquiry (Miles & Huberman, 1984). The sources were teacher interviews, two lesson observations, impromptu staff encounters, document analysis, and the scholar's interaction with ChatGPT and TeacherMatic, each serving a distinct purpose in the analysis (See Table 1).

5.3 Data analysis

In this study, the researcher automatically transcribed audio files from a recorder onto Microsoft Word Data and compiled notes from internal staff communications and teacher interviews. The scholar noted anecdotes using activity theory-based codes during the lesson observations (Garrett & McArdle, 2020), scrutinising institutional policies, regulations, guidelines, and GenAI user manuals. A synthesis of this data enabled a comprehensive analysis of the impact of ChatGPT and TeacherMatic on teacher roles and pedagogical approaches. Data were thematically categorised following Yin's (2018) approach. Research objectives shaped themes by examining the interconnectedness of classroom activity system components and the impact of GenAI integration. The activity system framework helped interpret interactions and influences among subjects, tools, rules, and other elements (Yamagata-Lynch, 2010). Contradiction analysis focused on system tensions, viewing them as drivers for potential changes in educational settings. Data encompassed variables detailing GenAI use in teaching, its impact on teachers, pedagogical methods, perspectives on GenAI-induced changes in the division of labour, and resultant role shifts in education.

Table 1. Data sources

Data source	Description	Purpose
Practitioner interviews	Semi-structured interviews with 15 user teachers of GenAI tools.	Collecting in-depth insights into teachers' experiences, perceptions, and opinions regarding the impact of ChatGPT and TeacherMatic on their role, classroom interactions, and pedagogy.
Lesson observations	Two lessons were observed where GenAI was used.	Capture real-time interactions between teachers, students, and GenAI tools, to get contextual insights and validate interview data.
Impromptu interactions	Spontaneous discussions about integrating GenAI in classrooms.	Capturing insights, perceptions, and strategies on GenAI classroom integration.
Documents analysis	Examined emails, and Microsoft Teams messages related to using GenAI.	To gauge institutional support, rules, leadership attitude, implicit and explicit pedagogy, and context. Allowed triangulation (Bowen, 2009).
Scholar's interaction with ChatGPT and TeacherMatic	Direct use of ChatGPT and TeacherMatic by the researcher as an instructor.	Acquire firsthand the functionalities and potential applications of these GenAI tools, informing a deeper understanding of their educational impact.

5.4 Ethics

To exercise caution, the researcher obtained ethical approval from the anonymised university's module tutor per program regulations. Participants received detailed information sheets outlining the study's purpose, procedures, and their rights, including the right to withdraw anytime. These provided informed consent before interactions, ensuring participants understood the study's objectives (Mack, 2005). Reflexive design decisions addressed power dynamics, ensuring participants felt respected and valued. Confidentiality measures safeguarded identities and data, with secure storage protocols ensuring privacy protection (Corti, Day, & Backhouse, 2000). The researcher encrypted data on OneDrive, retained it for thirty-five days, then securely deleted it (Kaiser, 2009).

6. Findings

The following insights surfaced from the study of integrating GenAI in further education. In the study, the scholar focused on GenAI's impact on the teacher's role and the classroom activity system. It provides a thematic narrative that examines GenAI technology as a tool in technology-enhanced learning. It explores changes in the GenAI-enriched classroom activity system and the associated pedagogical practices. The paper evaluates GenAI's impact on the teacher's role, discussing whether it poses as a challenger or companion to educators before summarising the contradictions encountered in the contextualised classroom activity system.

6.1 Emerging themes

Eight themes emerged from this study. Ten teachers (67%) used GenAI to customise student learning materials. Thirteen teachers (87%) mentioned that GenAI tools like ChatGPT and TeacherMatic changed the classroom activity system. Twelve (80%) employed TeacherMatic to generate materials and streamline administrative tasks. It allowed these teachers to spare time for student interaction. A trio (20%) preferred using ChatGPT for providing personalised content and improving student engagement. Eight practitioners (53%) highlighted that GenAI supported collaborative and constructivist teaching approaches, fostering critical thinking and personalised learning through its appropriately embedded pedagogy. Seven (47%) underscored that reflective and integrative pedagogical practices were evident in GenAI, promoting comprehensive learning experiences.

Surprisingly eight (53%) of the teachers viewed GenAI as a supportive tool that enhanced their teaching capabilities, and six (40%) regarded it as a competitive threat to replace them. However, one teacher (7%) held a neutral perspective, seeing GenAI as another tool, and emphasised the importance of balanced use.

6.2 GenAI as a tool in technology-enhanced learning

6.2.1 Customising learning material

Teachers improved student engagement through GenAI-designed personalised materials based on learner performance, preferences, and backgrounds.

Teacher (T03) said:

Using TeacherMatic, I can create quizzes and worksheets that match the individual needs of my students. I adjust the level of difficulty using the Blooms Taxonomy taskbar on the AI

Observation notes:

The two teachers observed using ChatGPT spent less time on administrative tasks and more on interacting with students during lessons, thanks to GenAI-generated materials.

6.2.2 The changing classroom activity system

GenAI tools like ChatGPT and TeacherMatic have altered the classroom activity system, easing instructional preparation and lesson facilitation.

Practitioner (T14) stated:

ChatGPT is excellent for creating interactive lessons, providing flexibility students love.

Another teacher (T06) mentioned:

TeacherMatic generates all my lesson plans and quizzes, giving me more time with students.

Observation notes:

T05 spent minimal time setting up lessons as materials were prepared in advance using TeacherMatic.

Impromptu interaction notes:

T02 and T09 highlighted to me the ease of instructional preparation, lesson facilitation, and assessment arising from GenAI integration during a Research and Education Development (RED) session.

Figures 3 and 4 summarise the activity systems where ChatGPT and TeacherMatic mediate enhanced teaching, supporting inquiry-based, collaborative, and reflective learning. Teachers prompt design and feedback, while students engage in questioning, verifying, and researching.

The following observations were noted regarding the classroom activity system.

6.2.2.1 Tools and artefacts

In the classroom, tools like ChatGPT, laptops, the internet, mobile phones, and learning materials were used to enhance the teaching and learning process. ChatGPT served as a GenAI tool facilitating interactive and personalised learning experiences.

6.2.2.2 Subjects

The primary participants in this activity were the teachers and students. Teachers used these tools to design and deliver lessons, while students engaged with the tools to aid their learning.

6.2.2.3 Rules

The integration of ChatGPT followed specific guidelines that were not policies. These included the Department for Education (DfE) Policy Paper, JCQ AI Use Guidance, anti-plagiarism rules, and the acknowledgment of ChatGPT's limitations of making mistakes (referred to as the 'ChatGPT Imperfection Mantra'). These rules ensured the ethical and effective use of GenAI in the classroom. Ironically ChatGPT was blocked by the institution. Students and teachers alike circumvented the blocking by using private data. The rules were non-binding guidelines, and they were not enforceable. The teachers' employment contract required them to perform their work personally and not delegate or assign responsibilities to someone else. This discouraged some of the teachers from using generative AI in assessing their students.

Figure 3. ChatGPT mediating the classroom activity system

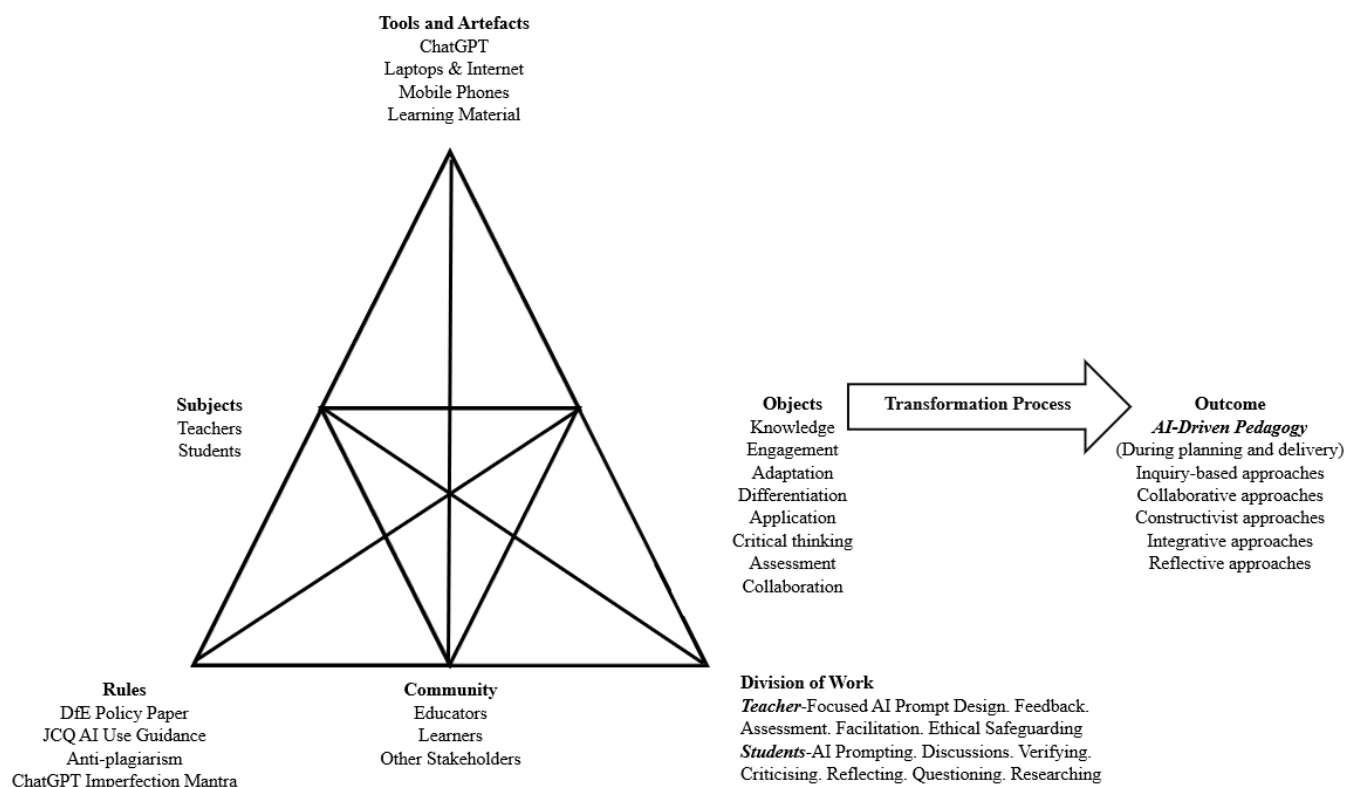
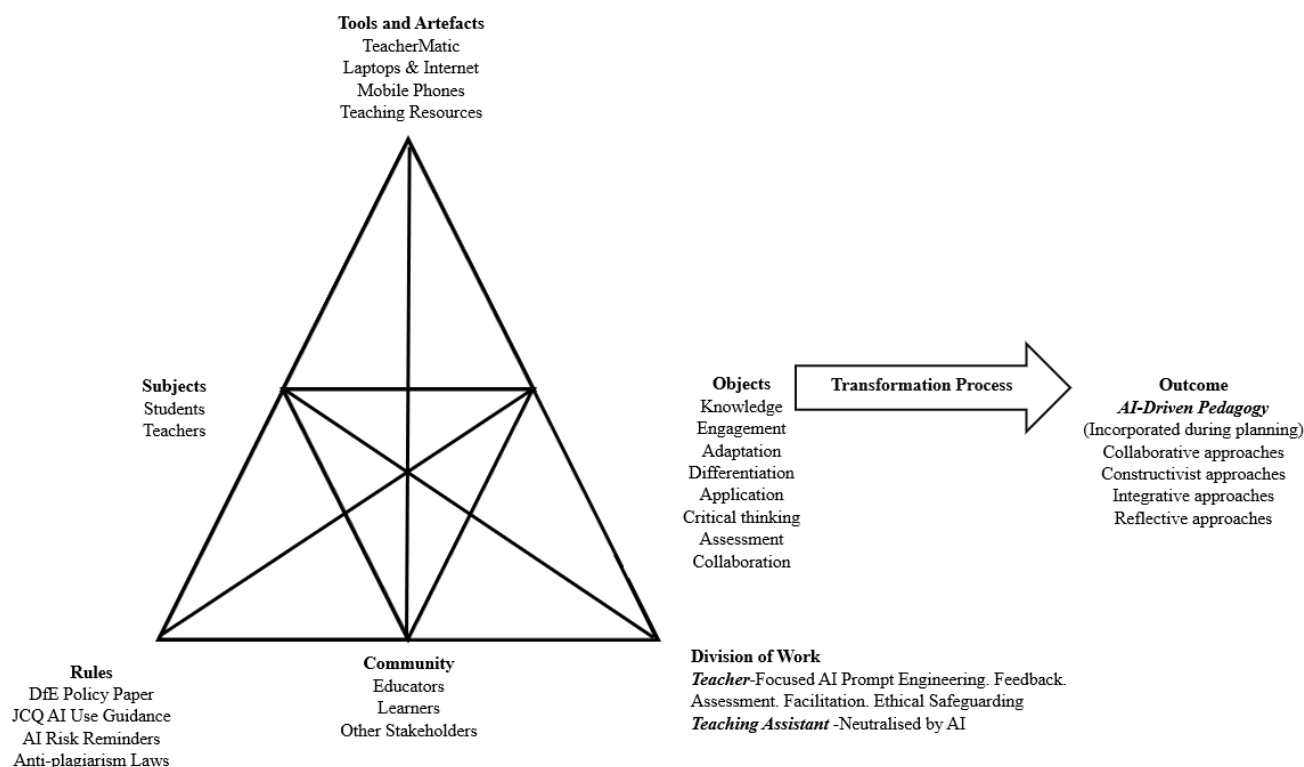


Figure 4. TeacherMatic mediating the classroom activity system



6.2.2.4 Community

The broader community included educators, learners, and parents who influenced and supported the classroom environment. This community played a role in shaping and sustaining the use of AI in teaching and learning.

6.2.2.5 Division of work

In this system, teachers and students had distinct roles. Teachers focused on designing GenAI prompts, providing feedback, assessing student performance, facilitating lessons, and safeguarding ethical practices. Students, on the other hand, engaged in prompting the AI, participating in discussions, verifying information, critiquing, reflecting, questioning, and conducting research.

6.2.2.6 Object

The objectives of this classroom activity included knowledge acquisition, student engagement, adaptation to individual learning needs, differentiation in teaching methods, application of learned concepts, development of critical

thinking, assessment of student progress, and collaboration among students.

6.2.2.7 Outcome

The goal targeted by the teachers in this study was to achieve GenAI-driven pedagogy during the planning and delivery stages of teaching and learning activities. This is achieved by employing various pedagogical approaches such as inquiry-based learning, collaborative learning, constructivist methods, integrative techniques, and reflective practices.

6.2.3 TeacherMatic and the classroom activity system

Twelve practitioners (80%) used TeacherMatic to generate classroom materials, streamline administrative tasks, and allow more time for student interaction.

Teacher (T06) remarked:

TeacherMatic generates all my lesson plans and quizzes, so I have more time to spend with my students.

Researcher's exploratory notes:

I read on TeacherMatic's website that the AI was developed with input from over 300 teachers, making it one of the best AI tools for educators.

6.2.4 ChatGPT and the classroom activity system

Three teachers (20%) preferred using ChatGPT during lesson delivery for its ability to provide personalised content and enhance student engagement.

Teacher (T15) highlighted:

"ChatGPT helps students research and verify information during the lesson, making learning more engaging. The only problem is that the college IT guys block it from teachers and students. We all end up using personal data to access the robot."

Observation notes:

"Students actively interacted with ChatGPT, leading to high-quality questioning and independent learning."

6.3 Pedagogical practices for GenAI-enriched classrooms

GenAI tools like TeacherMatic and ChatGPT supported collaborative, constructivist pedagogical approaches, enhancing critical thinking and personalised learning.

Teacher (T03) commented:

Resources I generate from TeacherMatic enable my students to brainstorm and share perspectives, strengthening their critical thinking skills.

Practitioner (T14) mentioned:

ChatGPT encourages students to explore topics independently, fostering a deeper understanding.

GenAI also supports reflective practices and integrative teaching approaches, creating a comprehensive learning experience.

Instructor (T12) remarked:

TeacherMatic's feedback tools help me reflect on my teaching strategies and make necessary adjustments.

Observation notes:

ChatGPT's integration into lessons enabled students to connect current topics with other subjects, promoting comprehensive learning.

6.4 GenAI as the teacher's challenger or companion

In examining GenAI as a teacher's companion, most teachers (53%, 8 out of 15) viewed GenAI as a complementary tool, not a competitor.

Teacher (T08), declared:

AI can never fully replace the human touch in teaching. It is a great assistant, not a competitor. How does it teach behaviour?

Practitioner (01) asserted:

No! AI won't take my job. There are things teachers do that AI can't do.

Instructor (T13) claimed:

ChatGPT helps me deliver more personalised lessons, but it's the teacher's role to guide and mentor students.

In terms of GenAI integration as a threat, interestingly, 40% (6 out of 15) of teachers expressed concerns about GenAI potentially replacing them.

Teacher (T11), noted:

"Who knows if AI won't leave me jobless by 2030?"

One participant expressed neutral perspectives on GenAI integration. One teacher out of fifteen (7%) held a neutral stance on GenAI, seeing it as a tool to use cautiously.

Teacher T03 stated:

AI is just another tool in our teaching arsenal. Its impact depends on how we use it.

Instructor (T07) recommended:

Balanced integration of GenAI is key. It's important to not over-rely on technology.

Table 2. Identified contradictions when integrating ChatGPT and TeacherMatic in education

Contradiction	Description	Example
Primary Contradictions	Internal conflicts within GenAI tools.	TeacherMatic operates like a closed system while ChatGPT is an open and more flexible system
Secondary Contradictions	Conflicts between GenAI tools and teacher roles or student interactions.	Teachers are using GenAI for administration work but fearing replacement. TeacherMatic exhibits indirect student use while ChatGPT provides direct student interaction. TeacherMatic offers personalised learning, and the robot does not interact with students, but ChatGPT offers personalised interactive learning as it converses with students.
Tertiary Contradictions	Teachers' perceptions of GenAI.	53% of teachers (8 of 15) saw GenAI as a complement, and the others (47%) saw it as a competitor soon to replace them.
Quaternary Contradictions	Conflicts in access, institutional policies, and assessment practices.	Teachers/students bypassing institutional blocks to access ChatGPT (13%) Discrepancies in GenAI-generated marks against teacher evaluations. TeacherMatic promotes collaborative learning pedagogics while ChatGPT adds independent research pedagogy.

These findings indicate that GenAI has positively impacted the classroom activity system while enriching longstanding pedagogical practices in further education. While some teachers expressed concerns about GenAI supplanting human roles, most viewed it as a valuable tool that improved teaching and learning. A balanced approach to GenAI integration is essential to maximise its benefits while maintaining the human aspect of education.

6.5 Contradictions

The study unearthed the contradictions summarised in Table 2. These consisted of one primary contradiction arising from multiple value systems within an activity, causing conflict; three secondary contradictions occurring when assimilating a new element (GenAI) into an activity; one tertiary contradiction happens when adopting an advanced method; and three quaternary contradictions appearing when changes in an activity conflict with adjacent activities.

7. Discussion

Earlier, this paper described the changing nature of TEL, where integrating GenAI raises questions about balancing technological capabilities and human teaching. The findings illustrate how constructivist and collaborative learning theo-

ries embedded in ChatGPT and TeacherMatic-driven classrooms impact, classroom interactions, pedagogical practices, and teacher roles, through the lens of activity theory. Table 3 summarises the findings before discussing them.

7.1 Impact of GenAI on education

GenAI tools like TeacherMatic and ChatGPT significantly alter the classroom activity system. TeacherMatic primarily streamlined administrative tasks, simplifying lesson preparation, and creating effective teaching materials, freeing instructors for direct student engagement. ChatGPT facilitated personalised content delivery and student interaction, fostering an inquiry-based and reflective learning environment. While TeacherMatic assists with planning and ChatGPT enhances lesson delivery, neither tool usurps the teacher's role in the classroom. These findings address the research question by demonstrating GenAI's roles in easing teachers' workloads, improving instructional preparation, and reshaping classroom interactions. While GenAI tools complement teachers' efforts, they do not replace the need for human mentorship and expertise. The literature review highlighted GenAI's potential and challenges in education, focusing on personalised learning, the threat of replacing teachers, and the irreplaceability of human educators. This paper's findings align with and expand upon these themes.

Table 3. Highlights from the study's findings

Section	Study highlights
6.0 Findings snapshot	Study on GenAI's impact in further education, focusing on teaching roles, pedagogy, and classroom dynamics
6.1 Emerging themes	Customising learning materials-67% personalised with GenAI, changing classroom systems-87% noted significant shifts, TeacherMatic use-80% streamlined tasks, ChatGPT for lesson delivery-20% enhanced engagement, support for teaching approaches-53% fostered critical thinking, teachers' perceptions- viewed GenAI as supportive
6.2 GenAI as a tool in technology-enhanced learning and changing classroom activity systems	Changing classroom activity system- transformed instructional preparation and delivery, customising- enhanced engagement through personalised content learning material, TeacherMatic- streamlined tasks allowing teachers to focus on students, and ChatGPT- useful at lesson preparation and during personalised lesson delivery and student interaction
6.3 Pedagogical practices for GenAI-enriched classrooms	Support for collaborative, constructivist, reflective, and integrative teaching approaches
6.4 GenAI as the teacher's challenger or companion	Teachers' perceptions of GenAI as a complementary tool or competitive threat. 53% viewed GenAI as complementary, 40% saw it as a competitive threat, and 7% were neutral
6.5 Contradictions	Primary- internal conflicts within GenAI tools where TeacherMatic is a closed system for professionals and ChatGPT is an open system for everyone, secondary- conflicts between GenAI tools and teacher/student roles where teachers used GenAI for administration work but feared being replaced by GenAI, tertiary-53% teachers viewed GenAI as complementary tool while 40% regarded it as a threat, and quaternary contradictions arising from GenAI integration- 13% of teachers bypassing institutional blocks to access ChatGPT

7.1.1 Personalised learning

Previous studies (Fassbender, 2024; Chen et al., 2020) emphasised GenAI's ability to tailor learning experiences. The current investigation's findings corroborate this, showing how TeacherMatic and ChatGPT facilitate differentiated learning and adaptive teaching approaches. However, unlike earlier work, the present study highlights a gap in addressing students' affective and social development, where human teachers still play a crucial role. While GenAI personalises lessons, it cannot replicate human sympathy and empathy.

7.1.2 GenAI as a threat to teaching roles

Literature (Selwyn, 2019; McKinsey Global Institute, 2017) predicted GenAI might replace teaching roles. While teachers expressed concerns about this potential displacement, this study suggests that GenAI is more likely to act as a complementary tool. This supports the argument that human elements of teaching, such as mentorship, character building, and safeguarding, are irreplaceable.

7.1.3 Irreplaceability of teachers

Researchers (Ghamrawi, Shal, and Ghamrawi, 2023; Nur Fitria, 2023) argue that human teachers' expertise and commitment are irreplaceable. This study reinforces this view, showing teachers play a vital role in facilitating GenAI-driven learning environments. Scholarship needs to develop practical guidelines to harmonise the integration of GenAI with existing educational processes, ensuring it enhances rather than diminishes the role of human educators.

7.2 Contributions to knowledge

This study advances TEL research by recognising the importance of understanding GenAI integration, appreciating the connections between GenAI tools and established pedagogical approaches, and reconsidering assumptions about GenAI in education.

7.2.1 Importance of understanding GenAI Integration

This research highlights the importance of understanding how GenAI tools integrate into classroom activity systems. Previous literature touched on the role of GenAI in personalised learning (Alasadi & Baiz, 2023; Chen et al., 2020; Tapalova & Zhiyenbayeva, 2022). However, findings in this inquiry show a need to explore GenAI's broader implications for collaborative and reflective pedagogical practices.

7.2.2 Connections between GenAI tools and pedagogical approaches

The study underscores the connections between GenAI tools and traditional teaching approaches. Its findings debunk the notion by Holmes, Bialik, and Fadel (2019) that GenAI technologies challenge existing pedagogies. For instance, TeacherMatic supports collaborative and personalised learning, while in addition to these, ChatGPT facilitates inquiry-based and reflective practices. This emphasises understanding how different GenAI tools can support various pedagogical strategies.

7.2.3 Reconsidering assumptions about GenAI in education

While Selwyn (2019) conjectured that robots might replace teachers, this study challenges that assumption. Instead, it presents GenAI as a companion that can enhance teachers' capabilities, suggesting that the future of education lies in blending human expertise with GenAI-driven efficiencies.

7.2.4 Human autonomy and GenAI-driven classrooms

This study questions GenAI-driven classrooms, highlighting practical challenges such as reduced teacher autonomy. As GenAI assumes more teaching tasks, balancing human and machine learning becomes crucial. Safeguarding and ensuring balanced integration are essential to prioritising students' interests while preserving human teaching. Expecting teachers to adopt GenAI without supporting rules sounds impracticable.

7.3 Activity theory in analysing AI-mediated classrooms

Activity theory provides a strong framework for analysing the contradictions and tensions arising when integrating generative AI (GenAI) in educational settings. Nevertheless, these contradictions appear in subtle ways. This makes it difficult for researchers to distinguish between minor frustrations and more significant, systemic issues. Teachers may re-

sist AI tools like ChatGPT and TeacherMatic. However, such initial annoyances may not be indicative of a fundamental contradiction. To identify deeper tensions, researchers must consider the broader context of technological mediation and its impact on classroom dynamics. For instance, shifts in pedagogical authority and changes in professional identity. Activity theory's focus on contradictions within an activity system sheds light on how technology reshapes teaching and learning practices, however, it is crucial to recognise that not every disruption is a contradiction, nor does every contradiction require immediate resolution. Instead, contradictions should be viewed as generative forces that drive pedagogical change and adaptation.

While the study adopts Activity Theory (AT) to explore GenAI's role in education, it also reveals the limitations of applying this framework to the changing interactions between teachers and generative AI tools. AT's activity system model effectively captures broad systemic tensions, but it may struggle to account for the non-linear, co-creative interactions that define AI's role in classrooms. GenAI tools, unlike traditional educational tools, do not simply mediate knowledge transfer; they actively shape and adapt the learning process in real time, creating new forms of mediation that challenge AT's conceptualisation of static learning tools. This study calls for further refinement of AT to better accommodate the generative and adaptive qualities of AI, as well as its impact on teacher-student dynamics. Future research should integrate ethnographic methods, discourse analysis, or design-based interventions to capture the shifting, interactive nature of AI's role in educational settings (Şahin Gökçeşlan, Tosun, & Erdemir, 2024). This would enable a more balanced understanding of how AI reshapes both pedagogical practices and educational environments.

7.4 Implications and future directions

Findings emphasise the reciprocal interaction between practice and scholarship in TEL. GenAI tools like TeacherMatic and ChatGPT offer significant benefits for instructional preparation and delivery, yet human elements of teaching, mentorship, guidance, and emotional support remain irreplaceable.

Future studies should focus on aligning GenAI advancements with existing education employment contracts to minimise potential hindrances. Policymakers and educational practitioners should develop frameworks balancing GenAI integration with human oversight. Continued research should develop structured professional development courses for teachers, helping them use the vast repository of teaching resources to enhance their pedagogical methods. Ongoing

research should also explore GenAI's long-term impacts on student development, particularly in affective and social domains, and investigate how GenAI can be harmonised with traditional teaching practices to improve overall educational outcomes. Integrating GenAI into education presents both opportunities and challenges. By viewing GenAI as a complementary tool, educators can harness its potential to enrich teaching and learning while maintaining the irreplaceable human elements that define effective education.

8. Conclusion

In conclusion, this study has probed into the innovative impact of integrating GenAI technologies, specifically ChatGPT and TeacherMatic, into further education settings. It has highlighted how these technologies reshape classroom interactions and support long-standing pedagogical approaches. This underscores their potential to improve personalised learning experiences and streamline teachers' administrative tasks. The findings accentuate GenAI as a valuable complement to educators. GenAI empowers teachers to focus more on student engagement, instructional delivery, and character development. In this paper, the scholar has identified key themes such as the customisation of learning materials, support for collaborative teaching practices, and fostering of critical thinking skills among students. These insights, attained through the activity theory lens, contribute to a deeper understanding of the changing roles of educators in GenAI-driven educational environments. Despite the positive reception among teachers regarding GenAI's benefits, the study also acknowledges alternative perspectives, including apprehensions about over-reliance on technology and the potential for it to overshadow humanistic aspects of education.

One limitation of this study was my position as an insider researcher. This potentially introduced bias due to familiarity with the institution and its members. To address this, a conscious effort was made to critically reflect on the investigator's role who actively employed strategies to minimise bias, such as triangulating data and seeking external feedback. Despite these efforts, it is important to acknowledge that this insider perspective may still have influenced the interpretation of the findings. Also, time constraints significantly restricted the depth of data collection and analysis, while the small sample size and researcher bias may have impacted the generalisability and objectivity of the findings. Participant bias further complicated the interpretation of results. Scholars need to be cautious when extrapolating this paper's conclusions.

Moving forward, subsequent investigations should aim to expand upon these findings by exploring larger and more diverse samples, mitigating biases through rigorous methodological approaches, and conducting longitudinal studies to track the sustained impacts of GenAI integration over time. Policymakers should address the restraining employment clauses and institutional policies surrounding GenAI implementation in education, ensuring that advancements align with professional practice and innovation. This study has shed light on the potential of GenAI in education, but there remains academic space for further exploration and refinement. By addressing these challenges and building upon the insights gained, future research can continue to advance our understanding of how GenAI technologies can best serve educational practices and outcomes in the future.

While CHAT's conceptualisation of an activity system captures systemic tensions, it may oversimplify the dynamic and non-linear interactions between teachers and GenAI tools. This limits the current study since GenAI is autonomous and adaptive in nature. This makes studying GenAI-mediated classrooms different from traditional classrooms where learning is mediated through static tools like textbooks or standard lectures. Also, the focus on a collective activity system risk overlooking micro-level negotiations and personal dimensions of AI adoption, such as trust, resistance, and professional identity shifts, which may not fit within the structured framework of an activity system.

Future research should build on CHAT by incorporating real-time methods like ethnographic observations, discourse analysis, or design-based interventions to capture the emergent, co-creative interactions between teachers and GenAI. There is a need for further theoretical refinement in CHAT to accommodate AI's changing agency and to explore how the concept of mediation might be redefined to reflect the unpredictable, dynamic nature of AI in educational settings.

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