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Identifying Challenges in Implementing Digital Transformation in UK Higher Education

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Abstract

Purpose: This exploratory study systematically dissects strategies against the challenges stalling digital transformation (DT) in the United Kingdom's (UK) higher education (HE) sector. It addresses the challenges impeding DT's incorporation and offers a blueprint for fostering innovation and efficiency within academic institutions.

Methodology: Employing a systematic literature review, the research integrates a nuanced literature review with Interpretive Structural Modelling (ISM). Through meticulous ISM analysis, including sensitivity analysis and level partitioning, a robust framework is developed to pinpoint and interrelate DT challenges.

Findings: Our investigation delineates a spectrum of impediments to DT in HE, most notably the need for more digital understanding among educators, intensified by inadequate support and resources. Our findings reveal that the effective integration of DT is hindered by factors such as insufficient educator digital skills, resistance to technology, and the continuous evolution of digital infrastructure.

Practical Implications: The study's findings and the developed level partitioning diagram offer invaluable insight into how DT must be integrated into the curriculum to enhance higher education. Additionally, it could further lead to research within digital infrastructure and how learning needs to be facilitated for students in HE.

Originality/Value: This study breaks new ground by systematically illuminating the centrality of the educator skill gap. By contributing insights into the educator skill gap, it proposes a unique analytical model that underscores actionable pathways for advancing DT initiatives in HE institutions.

Keywords: Digital Transformation in Higher Education, Interpretive Structural Modelling (ISM), Educator Upskilling, Technological Integration, Digital Infrastructure.

1 Introduction

In an era where digitalisation is rapidly reshaping the educational landscape, the urgency for higher education institutions to adapt and evolve has never been more pronounced (Lang, 2023). This study emerges against a global push towards digital transformation (DT), where higher education institutions (HEIs) must transcend traditional teaching methods and embrace digital capabilities to prepare a future-ready workforce. As the United Kingdom's (UK) HE sectors grapple with this paradigm shift, they face a pivotal challenge: successfully implementing DT without compromising educational quality (Lang, 2023). The significance of our research lies in its timely response to this challenge, offering an empirically grounded exploration of the barriers that educators encounter and the systemic changes required to navigate them effectively. Our comprehensive approach charts the current state of DT in UK HE and ensures that the pursuit of digital excellence remains harmonious with the foundational values of education.

Implementing digital technology into HE is becoming increasingly important to equip students with the skills and knowledge necessary to excel in the modern world (Lang (2023). According to Elangovan (2021), Owoc *et al*. (2019), and Rodríguez *et al*. (2017), DT in HE offers a range of benefits, such as a more personalised and flexible learning experience for students, improved student retention rates, employability, and enhance teaching quality of educators. For example, students can learn at their own pace and in a way that suits their learning style with the help of digital tools and platforms (Alenezi, 2023). These tools often include adaptive learning technologies that provide customised learning paths, helping students to grasp complex concepts better and improve their academic performance.

Moreover, digital technology empowers educators to offer more engaging and interactive learning experiences to students, which can aid them in better understanding complex concepts (Castro *et al*., 2019).

Teachers significantly impact shaping students' abilities and employment prospects as they interact directly with learners (Al-Amran *et al*., 2023). Therefore, it is crucial to equip educators with the latest knowledge and tools to improve their skills (Lang, 2023; Benavides *et al.,* 2020; Rof, 2020). For instance, professional development programs focused on integrating digital tools into the curriculum can help teachers create more effective and engaging lessons. Additionally, incorporating digital technology into teaching effectively enables students to navigate the rapidly changing job market (Bahodirovich *et al.,* 2021). Strong collaborations with industry leaders are also essential to ensure that students receive a relevant and up-to-date education, preparing them for the technological advancements in their future careers. However, it is necessary to establish strong collaborations with industry leaders to ensure that students receive a relevant and current education (Rof, 2020).

Implementing DT in UK HE is crucial but has several challenges (Elangovan, 2021). These challenges include the need for inadequate infrastructure (Habib *et al.,* 2021), lack of support and resources (Amhag *et al*., 2019), and lack of training for educators (Lang, 2023). Addressing these challenges is crucial to ensure educators and students effectively use digital technology. With proper planning and execution, the benefits of DT in HE can be achieved, leading to significant improvements in student outcomes and success (Akbari *et al.,* 2022).

This study identifies a significant research gap in the existing literature, highlighting the need for deeper investigation into the specific challenges faced by UK higher education

institutions in their digital transformation journeys. This gap underscores the necessity for focused research on these challenges to inform effective strategies.

Research Questions:

1. What are the critical factors influencing the successful implementation of digital transformation in HEIs?
2. How do these factors correlate and enhance teaching methodologies and learning outcomes in HEIs?

2 Methodology

This research employs a structured methodology to identify and address the challenges of implementing DT within the UK HE sectors. The approach combines a systematic literature review with the application of ISM, enhanced by sensitivity analysis, transitivity checks, and the positioning of challenges at various levels. This methodology is designed to comprehensively understand digital transformation barriers and develop strategic recommendations for overcoming these obstacles.

2.1 Research Procedure

The research begins with a systematic literature review to establish a foundational understanding of the current state of digital transformation in UK higher education. This review targets peer-reviewed articles, white papers, and official reports from the last five years, accessed through Web of Science.

A systematic literature review explored the challenges and barriers associated with digital transformation in higher education. The Web of Science database was selected for this review due to its comprehensive coverage of high-quality research across multiple disciplines, ensuring a robust and reliable collection of relevant studies (Gomis et al., 2023: Pranckutė, 2021). The following search string was used to capture a broad spectrum of literature on digital transformation and its associated challenges in the context of higher education ["digital trans*" OR "e-learn*" OR "online learn*" OR "virtual learn*"] AND ["challenge*" OR "barrier*" OR "issues"] AND ["higher education" OR "university*"]. From the above search string, 5,873 results were obtained as the initial sample data to be reviewed for the study.

Several inclusion and exclusion criteria were applied to refine the sample, focusing on publications since 2020 to ensure the relevance and timeliness of the findings, which reduced the results to 3,111. The document type was limited to articles and review articles, narrowing the count to 2,715 to ensure the inclusion of peer-reviewed and substantial research. Further limiting the language to English resulted in 2,598 documents, facilitating consistency in the review process. The research area was restricted to Education Educational Research, reducing the sample to 1,395 to maintain focus on studies pertinent to the educational context. The samples were downloaded, duplicates were removed, resulting in 1,318 unique articles. An abstract screening process shortlisted 182 articles for relevance and quality, and 43 full papers were finally selected for detailed analysis.

To comprehensively identify and address the barriers to digital transformation within the UK higher education (HE) sector, this study employed Interpretive Structural Modelling (ISM), a systemic analysis technique well-suited for developing a structured relationship among elements associated with complex issues (Attri, 2017; Sushil, 2012). The ISM approach is particularly relevant for delineating the intricate matrix of challenges and developing a

multilevel hierarchical model that reflects the dynamics within the DT process (Gardas *et al.,* 2017).

Adopting the ISM approach, as detailed in the methodological discourse by Janes (1988) and guided by applications in HE contexts (Gomis *et al.,* 2022, 2023, 2024), this study began with a systematic literature review to collate the DT challenges. Building upon the literature, including recent work by the scholars listed in Table 1 above, we compiled a comprehensive list of challenges impeding DT. This list formed the basis for the ISM analysis, where relationships among identified challenges were systematically explored and mapped, following the methodology used by Bolaños *et al*. (2005) to support strategic decision-making within organisations.

The study's methodology included sensitivity analysis, a key aspect of ISM that tests the model's robustness against variations in assumptions (Nilashi *et al.,* 2019). This analytical step ensures the derived model's stability and reliability, highlighting the methodology's applicability in strategic planning and policymaking within HE.

Sensitivity analysis further corroborates the ISM model's reliability by assessing the impact of initial assumptions or input data variations. The stability of the model can be evaluated by simulating changes to the relationships between challenges and observing the consequent effects on the hierarchical structure.

A MICMAC analysis is carried out by feeding the identified drivers into a binary reachability matrix, where transitivity rules are applied to ascertain the hierarchy of challenges. Furthermore, this phase includes partitioning challenges into distinct levels, categorising them based on their influence and dependency on one another. Additionally, a sensitivity analysis is conducted to scrutinise how variations in the positioning of these challenges might impact the overall structure. This analysis is crucial for providing insights into the stability and robustness of the identified hierarchy of challenges.

The research then proposes targeted recommendations to address the identified challenges by leveraging the insights derived from the ISM analysis. These recommendations are carefully designed to be actionable, ensuring they can be practically implemented within UK HE. Through this rigorous and systematic approach, the research aspires to offer valuable insights and practical suggestions for stakeholders involved in DT initiatives within the UK HE sectors. This methodology aims to identify and prioritise the challenges and contribute to the strategic planning and implementation of DT efforts, enhancing the sector's overall effectiveness and innovation.

The limitations of this approach were acknowledged, recognising that the subjectivity inherent in defining interrelationships could impact the model's final structure (Attri *et al.,* 2013). Nevertheless, the ISM's systematic and structured nature offers a transparent process for conceptualising the challenges to DT, emphasising the necessity for strategic intervention and policy refinement in HE. However, the chosen methodology for this research, ISM, is particularly adept at deciphering and delineating the intricate web of interrelated challenges in digital transformation within higher education. ISM is instrumental in exploring complex patterns and providing a structured framework to clarify and interpret interactions among multiple variables (Attri, 2017; Sushil, 2012). This method identifies the underlying structure within a complex scenario, making it highly suitable for the comprehensive analysis required to understand the multifaceted nature of digital transformation (Gardas *et al.,* 2017).

Furthermore, ISM's capacity to transform vague and poorly articulated models into visible, well-defined, and actionable structures justifies its application in this research, aligning with Janes's (1988) work on structuring complex issues. The method has proven effective in enhancing strategic decision-making within educational contexts, as evidenced by the work of Gomis *et al.* (2022, 2023 and 2024). Moreover, ISM's collaborative nature, which often involves the input of various stakeholders, is ideal for ensuring the relevancy and applicability of findings within the educational sector (Bolaños *et al.,* 2005). This ability to synthesise diverse perspectives into a coherent model is essential for the complex, rapidly evolving landscape of higher education's digital transformation.

3 Systematic Literature Review on Challenges of Digital Transformation in Higher Education

Digital transformation in higher education encompasses adopting digital technologies like online teaching platforms, improved administrative systems, and learning analytics to enhance educational delivery, student engagement, and institutional efficiency (Lang, 2023).

The integration of DT in HEIs has become an increasingly pressing concern in contemporary society. The rapid evolution of digital technology in HEIs revolutionising students' personalised learning experiences by providing flexibility and engagement (Elangovan, (2021), Owoc *et al*., (2019), Rodríguez *et al*., (2017); Li, 2022; Al-Emran *et al.,* 2022).

Integrating DT into HEIs has challenges and hurdles (Lang, 2023). Lack of skills among educators (Lang, 2023), maintaining teaching standards (Mourtzis *et al*., 2022), resistance to new technology (Doherty *et al*., 2023), and combining soft skills with technical skills (Almeida *et al*., 2023) are among the critical challenges that any HEI must address in the process of integrating DT. Furthermore, there are difficulties in adapting to the dynamic digital landscape, which requires constant updating, modifying digital infrastructure, and upskilling educators (Castro *et al*., 2019).

The systematic literature review identified several challenges, including educator skills, difficulty maintaining teaching standards, resistance to new technology, and the need to combine technical and soft skills. Every challenge is a complex task with various sub-challenges. These sub-challenges are integral parts of the main challenge and must be addressed. These are illustrated in Insert Table 1 by illustrating the four main challenges, each with sub-challenges, as explained below.

Insert Table 1: Challenges to Implement DT in HE

3.1 Lack of Skills to Implement DT in HEIs

One of the foremost challenges confronting educators is the need for more skills to implement DT in HEIs proficiently. Many educators struggle with the ever-evolving technological landscape, rendering them ill-prepared to equip students for the demands of modern industry (de Gusmão, 2022; Akbari *et al.,* 2022; Lang, 2023). This challenge encompasses several sub-challenges:

3.1.1 Lack of Support and Funding

Educators require increased institutional support and funding for their skill development, as highlighted by (Al-Amran *et al.,* 2022). However, the need for access to dedicated training programs and technological resources hinders their ability to bridge the skills gap (Lang, 2023).

The inadequate resources and support for developing teaching skills can significantly impact educators and students (Akbari *et al.,* 2022). Educators who need access to appropriate training programs, technological resources, and sufficient time for professional development may find it challenging to keep up with new teaching methods and technologies, leading to a decline in the quality of education they provide (Lang, 2023). Therefore, it is essential to equip students with the necessary knowledge and skills to succeed in their academic and professional careers (Al-Amran *et al.,* 2022). Furthermore, the consequences of inadequate support for teaching can be far-reaching, affecting both individuals and society (Alenezi, 2023).

3.1.2 Varying Skill Levels Among Educators

A notable gap often exists in educators' digital skills within HEIs (Gomis *et al.,* 2023a). While some demonstrate strong tech-savvy, others need more experience with digital tools (Al-Emran *et al*., 2022). This diversity in skill levels poses a challenge in achieving a uniform and effective implementation of DT across all courses and departments (Mian *et al.,* 2020).

The impact of varying digital skills among educators within HEIs results in an uneven adoption of digital technology across courses and departments (Padmaja *et al*., 2021), leading to disparate learning experiences for students, ultimately affecting their academic performance (Al-Emran *et al.,* 2023). Additionally, differences in educators' skills hinder the development of critical digital skills among students, which are crucial for their future careers. Therefore, HEIs must address this digital skill gap and support educators needing more digital tools experience (Alenzi, 2023). This can ensure that students receive a consistent, high-quality education, preparing them for the digital age.

3.1.3 Limited Resources

One major challenge HE faces in integrating DT is the limited resources available. HE institutions and educators require greater access to tools, technology, and materials to facilitate effective teaching and learning (ElSayary, 2023). These limitations exist in various forms, such as outdated or insufficient educational materials, a shortage of modern technology, and inadequate facilities (Gomis *et al.,* 2021).

Consequently, educators and students encounter barriers to quality education (Padmaja *et al.,* 2021). The absence of sufficient resources makes it difficult for educators to create engaging and interactive learning experiences, hindering their ability to foster a dynamic and effective educational environment (Gomis *et al.,* 2023b; Alenezi, 2023). Moreover, students miss valuable learning opportunities, negatively impacting their academic and professional growth (Padmaja *et al.,* 2021). To ensure that educators and students have the necessary tools and materials to excel in their educational endeavours, it is crucial to address the issue of resource scarcity in higher education (ElSayary, 2023; Padmaja *et al.,* 2021)

3.1.4 Integrating into teaching

Integrating technology into teaching methodologies is a significant challenge faced by educators in higher education during the digital era (Alenzi, 2023). Although incorporating

digital tools and platforms can have immense benefits, many educators need assistance with the learning curve of these technologies (Mian *et al.,* 2020). To leverage these technologies effectively, educators must become proficient in using various digital tools and adapt their teaching strategies (Mian *et al.,* 2020). Moreover, ensuring that technology integration improves the learning experience can be challenging while only partially replacing traditional methods (Lang, 2023). Therefore, educators must find the right balance between technology and pedagogy, address the digital divide among students, and continuously update their skills to keep pace with evolving technologies (Gomis *et al.,* 2022).

3.1.5 Keeping up with the Technological Advancements

Keeping up with the rapid pace of technological advancements is an ongoing challenge for educators (Diaz *et al.,* 2022). Today, cutting-edge technology quickly becomes outdated, requiring educators to constantly update their skills and knowledge (Chen *et al.,* 2022). HEIs should establish mechanisms enabling educators to stay well-informed about the latest trends and technologies to address the challenge of technological advancement. This can encompass regular updates through professional development sessions, online resources, and collaborations with industry partners (Wasim *et al.,* 2022).

3.2 Maintaining Teaching Standards

3.2.1 Online Teaching

The shift to virtual learning environments has been challenging for educators worldwide; this transition has posed significant challenges for teachers (Greenhow *et al.,* 2022). Educators must adapt their teaching approaches to ensure that students remain engaged and motivated in online platforms (Alenezi *et al.,* 2023). This means using technology to its fullest potential, providing interactive learning opportunities, and designing engaging assignments that align with students' interests and learning styles (Alenezi *et al.*, 2023)

Furthermore, personalised feedback is essential to effective online learning (Gomis, 2024). Teachers must provide individualised feedback to students on their work, ensuring they receive guidance and support to improve their performance (Greenhow *et al.,* 2022). This requires teachers to use various tools, such as rubrics, self-assessments, peer evaluations, and video feedback, to provide targeted feedback to students (Alenezi *et al.,* 2023).

Fostering a sense of community in virtual classrooms is another challenge educators must overcome (Diaz *et al.,* 2022). Teachers must create a collaborative learning environment where students feel comfortable sharing their ideas and collaborating with their peers (Lang, 2023). This requires teachers to use various strategies, such as icebreakers, group work, and discussion forums, to encourage student interaction and engagement.

Therefore, the shift to virtual learning environments has placed significant demands on educators (Alenezi *et al.,* 2023). However, by modifying teaching approaches, providing personalised feedback, and fostering a sense of community in virtual classrooms, teachers can ensure that their students receive high-quality education, even online (Alshahrani, 2023).

3.2.2 Changing Education Landscape

The changing educational landscape refers to the dynamic and evolving environment of education influenced by technological advancements, shifting student demographics, and changing industry demands (Alenezi, 2023). This transformation necessitates continuous updates to curricula, professional development for educators, and strategic resource allocation by educational institutions to maintain teaching standards and effectively prepare students for the modern workforce (Diaz *et al*., 2022). As Education constantly evolves, educators must be versatile and inventive to keep up with the changes. Furthermore, educators must remain updated with the latest technologies and teaching techniques to cater to their students' diverse learning needs (Mourtzis *et al.,* 2022). Additionally, educators should revise their course content to match industry requirements and prepare students for the contemporary workforce.

3.2.3 Limited Resources

The lack of adequate resources, including financial restrictions and limited access to technology, presents significant challenges in maintaining teaching standards (Elsayaray, 2023). Educators require a range of resources to provide quality education to their students, including access to technology, textbooks, teaching materials, and professional development activities (Alenezi, 2023). However, the lack of financial support and restricted access to technology impede their ability to acquire these essential resources.

Furthermore, insufficient funding can limit the ability of educators to purchase essential teaching materials and participate in professional development activities, which are crucial for their growth and development (Padmaja *et al.,* 2021). Educators require resources and opportunities for professional growth to stay updated with the latest teaching methods, techniques, and trends (Alenezi, 2023). If they do not have access to these resources, they may not be able to provide superior education, which can negatively affect the academic performance of their students. The need for more resources is a significant issue that affects the education sector, leading to a decline in the quality of education provided to students (Elsayaray, 2023; Padmaja *et al.,* 2021). Adequate funding and access to technology and other essential resources are critical to maintaining teaching standards and providing quality education to students.

3.3 Resistance to Change

3.3.1 Technophobia

Numerous educators experience technophobia, which describes the fear or anxiety of using new technologies in teaching practices (Konakli, 2022). This fear results from a lack of familiarity with digital tools, concerns about technical difficulties, or uncertainty about effectively integrating technology into their pedagogical approaches (Yang & Wang, 2023). Despite the potential benefits of technology in education, such as increased engagement and accessibility, many educators are hesitant to adopt new tools in their classrooms (Padmaja *et al.,* 2021). To overcome this fear, educators must receive adequate training and support to become more comfortable with digital tools and effectively integrate them into their teaching practices (Alenezi *et al*., 2023). In this way, educators can harness the power of technology to enhance the learning experience for their students.

3.3.2 Threat to Traditional Teaching Methods

The proliferation of digital teaching methods significantly threatens educators' traditional teaching practices (Kaplan, 2022). The increased reliance on technology in the

classroom could undermine the effectiveness and authority of teachers, as students may be inclined to rely more heavily on digital resources and tools instead of engaging with their teachers (Konakli, 2022). This shift in the learning paradigm could have far-reaching implications for the future of education, raising questions about the role of technology in the classroom and the impact of digital learning on students' academic performance.

3.3.3 Lack of Confidence

Many educators today need to be more confident using new technological tools to enhance their teaching methods (Al-Emran *et al.,* 2022). In today's digital era, educators must have the necessary skills and expertise to integrate technology into their teaching effectively (Alenezi *et al.,* 2023). However, more training opportunities and adequate support systems can worsen educators' lack of confidence in new technologies (Padmaja *et al*., 2021)

With proper guidance and support, educators may be able to navigate the complex world of technology, leading to frustration and a reluctance to incorporate digital tools into their teaching methods (Al-Emran *et al.,* 2022). This, in turn, can negatively impact their students' learning experiences. Therefore, offering educators practical training and support systems is essential to help them gain the skills and confidence they need to succeed in the digital age. Combining Soft Skills with Technical skills (Kilag *et al.,* 2023).

3.4 Combining Soft Skills with Technical Skills

3.4.1 Lack of Training and Resources

In today's rapidly evolving technological landscape, educators face the challenge of imparting essential technical and soft skills to students (Almeida *et al.,* 2023). However, many educators need help to deliver effective instruction due to several challenges, including inadequate training and resources (Mourtzis *et al.,* 2022). Research studies have shown that educators require additional assistance in teaching these skills.

Moreover, limited access to professional development opportunities and insufficient funding for materials and technology can further hinder educators' ability to effectively teach these essential skills to students (Alenezi *et al.,* 2023). This can result in students needing more critical knowledge and skills for success in today's job market (Almeida *et al.,* 2023). Therefore, addressing these challenges and providing educators with the necessary resources, training, and support is crucial to ensure students receive the best education possible

3.4.2 Constraints and Additional Workload

Educators need help cultivating their students' technical and soft skills (Alenezi, 2023). The limited time and increased workload make prioritising comprehensive skill development initiatives challenging. Moreover, balancing administrative duties, extracurricular activities, and curriculum requirements only compounds the problem.

The biggest challenge HEIs face when implementing DT is upskilling educators. This is the primary challenge that needs to be overcome, and addressing the underlying sub-challenges is crucial. Moreover, any educational system's success ultimately depends on its educators' quality. Therefore, any initiative to improve education should prioritise equipping teachers with the necessary skills and support to engage and educate students effectively. This will enhance student learning outcomes and improve their employability prospects.

4 ISM Analysis

The identified challenges were analysed through ISM analysis, where a MICMAC graph was developed to identify their implications through binary reachability and transitivity matrixes. The binary analysis corresponds with the relationship and correlation of each challenge within each other and establishes generalisation within the data obtained from the study.

To generalise the critical factors from the MICMAC analysis, Graph 1 was developed to illustrate the implications of each challenge and to categorise the drivers of improvement in alignment with their correlation. These can be classified into four categories: the fundamental drivers (independent), facilitating drivers (dependent), and non-influential/already accommodated drivers (autonomous) in enhancing teaching in HE. Each categorisation has an interpretation: independent being critical for driver implementation, dependent being a key facilitator and autonomous being a subsidiary.

Insert Graph 1: Categorisation of the driver.

As per the MICMAC analysis in Graph 1, the obtained drivers can be categorised further into their respective levels of influence and correlation. It is identified that four drivers (D2, D8, D5, D12) are under the independent quadrant with a high level of correlation but a low influence level. Conversely, there are three drivers (D7, D4 & D6) under dependent with low correlation but strong influence, and four drivers under autonomous with non-influential or already accommodated drivers. One key finding was that there were no drivers under Linkage, as it might be that most of the drivers need influence, as illustrated by the fact that most fell under independent and dependent quadrants within the MICMAC analysis. Following the MICMAC analysis, a level partitioning diagram could be formed that interrelates the transitivity and sensitivity matrixes and integrates ISM to identify the coherency in the developed drivers for further improving Digital Transformation in the UKHE. The level partitioning revealed some essential aspects of the digital transformation implementation, and the study's main findings were obtained by going through them in detail.

5 Main findings

The developed level partitioning diagram derived by ISM analysis helps to answer the fundamental research question of how to implement DT in HE by demonstrating a correlation between the challenges (Figure 1). The study identified four primary and thirteen sub-challenges that must be addressed to successfully integrate DT into the education system. The integration of DT has the potential to transform the learning experience for students and revolutionise the education landscape. Thirteen sub-challenges are classified into four levels based on their criticality, with level 1 being the most crucial and level 4 being the least critical. The study indicates that focusing on overcoming level 1 challenges would help overcome the challenges at levels 2 and 3 and eventually resolve the challenges at level 4. Hence, the study recommends focusing on level 1 challenges to overcome the identified challenges and integrate DT successfully into higher education. For example, Overcoming the challenge (D8) will help reduce additional work and effort (D13), and then it will change the educational landscape and maintain the teaching standard (D7). Maintaining teaching standards further supports the integration of skills into teaching (D4), enhances online teaching methods (D6), reduces the

threats to traditional teaching methods (D10) and builds confidence in adopting teaching strategies.

Insert Figure 1: Level Partitioning of the drivers developed from the study.

5.1 Recommendations

At Level 1, universities require more resources to maintain their standards (D8) and better training in both soft and technical skills (D12). However, this transformative journey comes with its challenges. The results indicate that one of the primary obstacles is the need for more skilled educators, which includes sub-challenges (of D12) such as varying skill levels (D3), which leads to inadequate support and funding to improve skills (D1), and the need to keep up with rapidly advancing technologies.

This study also finds a significant positive relationship between maintaining high teaching standards (D8) in the face of shifting educational landscapes that require additional work and effort (D13) to change the educational landscape to maintain teaching standards (D7). Specifically, this correlation can significantly enhance teaching skills (D4) among educators, along with adopting more effective teaching methods (D6). Additionally, this correlation can also play a crucial role in building educators' confidence in adopting new technologies, which in turn can contribute to the maintenance of education standards (D7) in the long run.

Combining soft and technical skills is essential to address the varying skill sets among educators (D12). Soft skills coupled with technical skills such as programming, data analysis, and digital literacy can help bridge the gap between individuals with different skill sets (D3).

However, sufficient funding and resources (D1) are also necessary. For instance, investing in modern technology and infrastructure can enable educators to develop new teaching strategies (D2) that incorporate soft and technical skills. These new strategies can help reduce technophobia (D9) among students and faculty members, leading to improved digital literacy and easier adoption of new technologies.

Universities must explore innovative financing options, develop strategic plans to secure the necessary funds, and assess the financial capacity and willingness to invest in these areas (Alenezi. 2023). Moreover, keeping up with the advancements in DT in HE is paramount. Therefore, investing in continuous professional development programs for educators can help them stay updated with the latest technological advancements, which can positively impact the overall quality of education. By providing funding and resources and adopting new teaching strategies, we can bridge the gap between varying skill sets, reduce technophobia, and keep up with the advancement of DT in HE.

Since the challenges at level 4 are the most critical to integrating skills into teaching (D4), enhancing teaching standards (D6), and building confidence in adopting new teaching strategies (D11), universities must intervene to change the educational landscape (D7) and establish constraints and additional work and efforts to help maintain standards. What stands out is that together, these results provide important insights into navigating these challenges successfully; HEIs must prioritise the upskilling of educators through dedicated training programs and adequate support. Equally important is providing essential resources and infrastructure to facilitate effective technology integration. Potential funding sources include government grants, private partnerships, alum donations, tuition fees and cost efficiency

(Benavides *et al*., 2020; Lang, 2023). Moreover, a proactive approach to keeping educators updated with the latest trends and technologies and addressing their varying skill levels is crucial. By overcoming these challenges, higher education can harness the full potential of digital transformation to provide students with a high-quality and future-ready education, empowering them to excel in an ever-evolving world.

5.2 Practical and Theoretical Implication

5.2.1 Practical Implications

The actionable recommendations provide a roadmap for universities to enhance their DT efforts, improving teaching standards and digital literacy among educators and students. These recommendations can help institutions secure necessary resources, train educators effectively, and keep up with technological advancements.

5.2.2 Theoretical Implication

This research contributes theoretically by advancing our understanding of digital transformation in higher education, offering insights into how institutions can integrate technology effectively. It enriches existing literature on educational technology adoption, organisational change, and policy development, providing a framework for enhancing teaching methodologies and improving learning outcomes in contemporary educational settings.

This study innovates in higher education digital transformation by introducing a holistic framework based on MICMAC analysis and level partitioning. Unlike prior literature that often discusses isolated challenges, this research categorises challenges into independent, dependent, and autonomous drivers, offering a systematic approach to prioritising actions for UK HEIs. To fill the gaps identified above by integrating theoretical insights with practical implications, this paper provides a structured pathway for strategic decision-making in HE digital transformation.

5.2.3 Limitations of the Study

Notwithstanding this limitation, the study suggests unique findings through secondary data, and further studies need to be carried out to validate these findings through primary data, e.g. carrying out iterations of the Level portioning by taking an HEI as a case study, etc.

6 Conclusions

This investigation aimed to assess, identify, and address the challenges hindering digital transformation (DT) within the UK higher education (HE) sector. By pinpointing these challenges, the research contributes to the strategic planning and effective implementation of digital transformation initiatives, ultimately enhancing innovation and efficiency in educational institutions. However, despite significant research efforts, a notable gap exists in understanding the specific challenges and barriers UK higher education institutions face in their digital transformation journeys. Addressing these gaps through systematic analysis and practical recommendations is crucial for advancing research, informing practice, and benefiting society.

This study has found four main challenges that generally have associated difficulties. One of the more significant findings is that universities need to prioritise allocating existing resources to help maintain standards and enhance training programs that combine soft and technical skills. This prioritisation is crucial, especially when resources are often limited and must be judiciously managed. The results of this research support the idea that preserving

teaching standards and shifting educational landscapes requiring additional work and effort has a significant positive relationship. These findings suggest that providing more resources to teachers will promote teaching skills and keep up with the advancement of DT in HE.

The findings reported here shed new light on several challenges in implementing DT in HE. A noteworthy correlation was observed between upholding teaching standards (D8) amidst constantly evolving educational environments that demand extra work and effort (D13) and the improvement of teaching skills (D4), methods (D6) and educators' confidence in embracing new technology, which in turn would contribute to the maintenance of education standards (D7). The developed level partitioning will be prominent in addressing these challenges and provide further insight into successful implications.

This study has enhanced our understanding of the relationship between the challenges within the current HE context and the prioritised implications of these challenges in DT. However, the scope of this study was limited as it did not collect primary data. Notwithstanding this limitation, the study suggests unique findings through secondary data, and further studies must be carried out to validate these findings through primary data.

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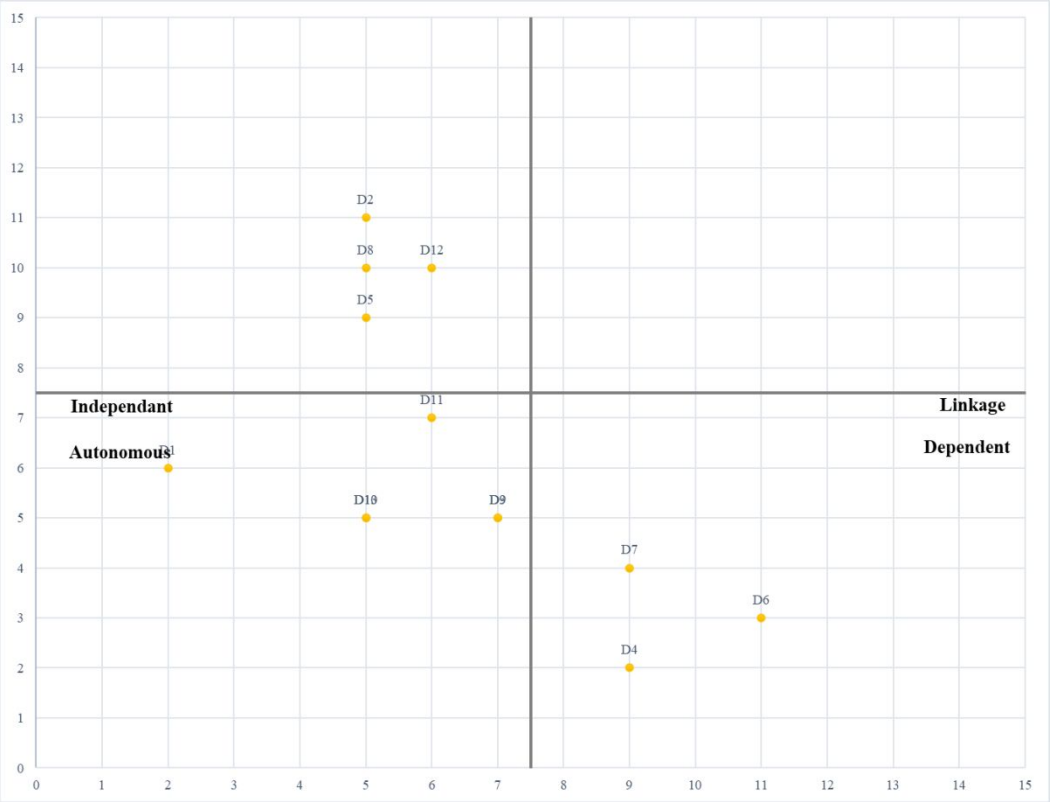
Table 1: Challenges to Implement DT in HE

Challenges	Sub-challenges
1. **Lack of Skills** (de Gusmão 2022, Akbari *et al*. 2022 and Leng 2023)	**Lack of support and funding** (Lang 2023, Al-Emran *et al*. 2022, Knoop *et al*. 2019)
	Limited resources in developing skills (Elsayary 2023, Padmaja *et al*. 2021)
	Varying skill levels (Al-Emran *et al*. 2022, Padmaja *et al*. 2021)
	Integration into teaching (Brahma *et al*. 2021, Mian et al. 2020)
	Keeping up with Advancements with DT (Diaz *et al*.2022, Bahodirovich *et al.* 2021)
2. **Maintaining Teaching Standards** (He *et al*. 2023, Mourtzis *et al*. 2022 and Greenhow *et al.* 2022)	**Teaching online** Greenhow *et al.* 2022, Petronzi *et al*. 2022 and Alam 2020)
	Changing education Landscape (Srivastava *et al*. 2023, Mourtzis *et al.* 2022, Alam 2020)
	Limited resources to help maintain standards (Elsayaray 2023, Clarin *et al.* 2022, Padmaja *et al.* 2021)
3. **Resistance to New Technology** (Nodira *et al*. 2022, Kaplan 2022 and Kane 2019)	**Technophobia** (Konakli 2022, Teixeira *et al.* 2021)
	Threat to traditional teaching methods (Kaplan in 2022, Konakli 2022, and Nodira *et al*. 2022)
	Lack of confidence (Al-Emran *et al.* 2022 and Teixeira *et al.* 2021)
4. **Combining Soft Skills with Technical Skills** (Doherty *et al.* 2023, Almeida *et al.* 2023, Hirvonen et al. 2022, Bastos *et al.* 2019)	**Lack of training and resources** (Moraes *et al.* 2023, Almeida *et al.* 2023, and Clarin *et al.* 2022)
	Constraints and additional work and effort (Alenezi 2023, Rukman *et al.* 2023)



Graph 1: Categorisation of the driver

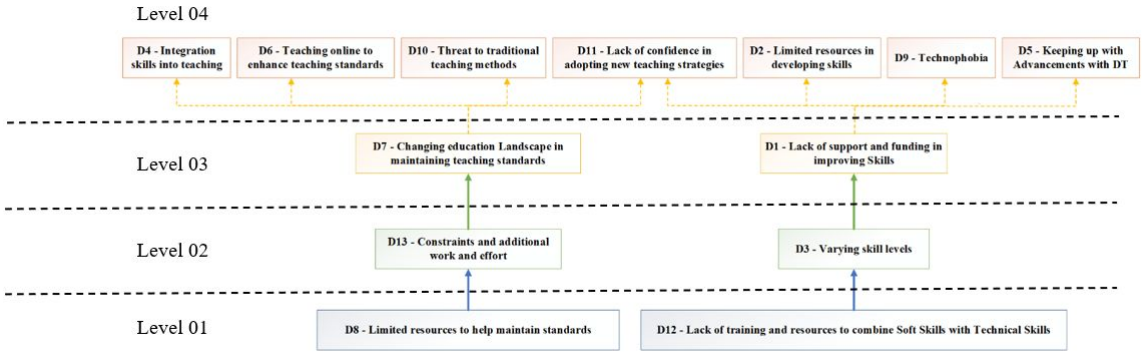


Figure 1: Level Partitioning of the drivers developed from the study.

Reviewer Comments

Manuscript Number: *QAE-05-2024-0076 (R1)*

Title: *Challenges of Implementing Digital Transformation in the UK Higher Education.*

Journal: *Quality Assurance in Education*

Co-Editor Comments to Author:			
Recommendation: N/A			
	Reviewers comments	**Authors comments**	**Page**
General	1. The tables and figures are only to be located at the end of the manuscript that is produced during the submission process when the separate table and figure documents are uploaded in order. Tables and figures that are uploaded separate must have titles. 2. Identify location of the tables and figures in the manuscript such as: ---------- Insert Table 1 here ---------- 3. Address all of the reviewers' concerns below.	Many thanks for your comments. The suggested changes are carried out in the revised manuscript submitted.	N/A

Reviewer 01			
Recommendation:			
	Reviewers comments	**Authors comments**	**Page**
General	There is no need to put "strategic framework for institutions to catalyse change" (pg.3 l 16 & 17) in bold.	Thank you for your feedback. We have revised the text to remove the sentence with better wording.	N/A
	On pg.3. l 45 it is written "Implementing DT in H is crucial". H should be corrected to HE.	Thank you for pointing that out. The correction has been made, and "H" has been changed to "HE" on page 3, line 42.	Page 3 Line 42
	The last paragraph of Introduction has a sentence - "All these factors are essential to ensure that educators and students can effectively use digital technology." (pg3 l 48-49). Before this sentence the challenges have been mentioned. So the sentence following the challenges - that all these factors are essential doesn't make sense. Do you mean to say challenges are essential or do you mean addressing the challenges is essential?	Thank you for your valuable feedback. We have added the statement, "Addressing these challenges is crucial to ensure that educators and students can effectively use digital technology." This addition helps to clarify the importance of overcoming these issues	Page 3 Line 45-46
	et al. should be in italics in line with the journals policy.	Thank you for your feedback. I have corrected "et al." to italics throughout the manuscript and incorporate appropriate referencing standards in accordance with the journal's policy.	N/A
	On pg.4 l 17 there is a sentence - These challenges are detailed in Table 1 Below. Delete the word Below.	"Below" has been deleted as recommended.	Page 6 Line 41
	1st paragraph on pg.10 is a mere repetition. The methods have already been stated in earlier paragraphs.	Many thanks for your comment. We have now removed the repetitive sections.	N/a
	On pg. 10 l 3-4 state - "The gap methodology involves listing the challenges to implementing DT as identified through a comprehensive literature review and, where applicable, from primary data." Which primary data has been used? Please clarify.	Thank you for the comment. The study does not use primary data and is explicitly underpinned by a Systematic Literature Review. More discussion has been provided to explain how the systematic literature has been carried out to further clarify the methodology.	Page 4; Lines 26-46
	On pg. 14 the last three lines are - "However, the scope of this study was limited in terms of primary data analysis. Notwithstanding this limitation, the study suggests unique findings, and further studies need to be carried out to validate these findings through primary data." Two things on this. One, again, authors have claimed that scope was limited in terms of primary data analysis. Which primary data the authors are referring is not clear. Secondly, authors are self-contradicting themselves by saying that further studies need to be carried out to validate these findings through primary data analysis. Thus, there is quite a confusion surrounding primary data analysis which needs to be clarified.	Thanks for pointing out. The correction has been made. Some primary data were collected for the holistic study, but they are not applicable to this paper. Therefore, the term "primary data" has been removed, and a few sentences highlighting the study's limitations have been added for clarity.	Page 13 Line 33 - 36

	On pg.10 l 16 it is claimed that - "The research then proposes targeted recommendations to address the identified challenges by leveraging the insights derived from the ISM analysis. These recommendations are carefully designed to be actionable, ensuring they can be practically implemented within UK HE. Through this rigorous and systematic approach, the research aspires to offer valuable insights and practical suggestions for stakeholders involved in DT initiatives within the UK HE sectors." It is suggested that the authors make a separate heading for the recommendations and put all of them together at one place.	Thank you for your feedback. I have reorganised the recommendations and related content as suggested. The recommendations, part of the conclusion, have been placed into a new sub-section (5.1). The structure is now organised as follows: 1. Recommendations (5.1) 2. Practical implications of the study (both practical and theoretical) (5.2) 3. A brief section on the limitations of the study (5.3) This reorganisation ensures that all recommendations are presented together in a clear and structured manner.	Page 12 to 13
	On pg. 13 l 41 it is stated - "However, sufficient funding and resources (D1) are also necessary." This is a very general and vague statement. From where the funds will come should also be discussed. Are the universities/institutions in a position to arrange for the additional funding is not clear. So it looks like a highly theoretical suggestion that more funds should be provided.	Thank you for your valuable feedback In response, we have extended the text to provide a more detailed exploration of potential financing options and strategic planning considerations. Specifically, we have expanded on how universities need to explore innovative financing options and develop strategic plans to secure the necessary funds, as well as assess their financial capacity and willingness to invest in these areas. Thus, we have revised the sentence to read, "Universities may need to explore innovative financing options and develop strategic plans to secure the necessary funds, as well as assess the financial capacity and willingness to invest in these areas."	Page 12 Lines 36-38
	A similar thing on pg.14 l 6 - "Equally important is providing essential resources and infrastructure to facilitate effective technology integration". Who will provide additional resources and from where?	Thank you for your comment As per the literature review, “potential funding sources include government grants, private partnerships, alumni donations, tuition fees, and cost efficiency measure”. We have added this sentence in the paper, however these options can be explored further to secure the necessary resources and infrastructure for effective technology integration.	Page 13 Lines 4-6
	Even in conclusion (pg. 14 l 25) same thing has been said - "One of the more significant findings is that universities need more resources to help maintain standards and more training and resources combining soft and technical skills." Authors need to understand that resources are scarce. They are not so easily and readily available. A more	Many thanks for your comment. In response to your feedback, we have added a discussion on the responsibility for providing additional resources and the potential sources from which they could be secured. Specifically, we have explored how universities might identify and leverage various funding	Page 14 Lines 2-5

	pragmatic view on provision of resources is expected from the authors. Or they should make it clear that the UK universities are flush with funds.	mechanisms, such as institutional budgets, external grants, partnerships with industry, and other potential revenue streams. Further in conclusion we clarifies "One of the more significant findings is that universities need to prioritise the allocation of existing resources to help maintain standards and enhance training programs that combine both soft and technical skills. This prioritisation is crucial, especially in a context where resources are often limited and must be judiciously managed."	
	Reference list should be in the format of the journal.	The reference list has been updated as per the journal requirement. Many thanks for pointing this out.	N/A
	DOIs are missing in the references.	Thanks for pointing out. We have added all DOIs where applicable.	N/A
	On pg. 13 l. 10 it is stated - "According to Figure 3..." There is no Figure 3. Typo needs to be corrected.	Thanks for addressing this; we have made the correction.	N/A
Originality	Yes, the paper contains new and significant information adequate to justify publication.	Many thanks for your comment.	
Relationship to Literature	**1.** Authors have missed out the review for the 4th challenge. Paragraph 2.4 is missing. **2.** At the end of the review a research gap statement should be included and it should be stated as to how this study endeavors to close that gap. **3.** For the SLR it should be indicated as to how many papers were screened for selection initially and eventually how many of them were selected.	Thanks for pointing out: 1. The subheading was missed in error; however, it is now resolved by adding 3.4 in the section. (Page 10) 2. We have included a brief statement about the research gap at the end of the introduction, linking it to the conclusion 3. The systematic process of carrying out the SLR is now detailed under section 2.1 of the research procedure. It now provides details such as the search string, inclusion-exclusion criteria, and screened articles that were used for the study.	Page 10; Line 26 Page 4; Lines 1-10 Page 4; Lines 26-46
Methodology	Methodology for the SLR should be given before the reviews. First presenting the results and then describing the method looks odd.	Thank you for your comment. We have now included a detailed description of how the SLR was carried out within the research procedure section. Additionally, we have changed the structure, i.e. methodology, before the literature review as suggested for better readability. We trust this has addressed the reviewer's concerns.	Page 4; Lines 26-46

Results	Table 1 and 2 should be briefly explained taking one example each. It cannot be assumed that common readers would understand them without any explanation. Similarly Graph 1 and Diagram 1 deserves more explanation.	We have removed tables 1 and 2 that explained the ISM transitivity analysis, considering the word count and the implications of it being out of the scope of this study. Also, this procedure is common when carrying out ISM analysis, so replicating it would have an adverse effect on our word count. We have further explained graph 1. Figure 1 has now moved to the main findings. Cross-references for all the above are already available in the discussion.	N/A Page 11 Lines 27 to Page 12 Line 10
Implications for research	Implications need to be elaborated.	Implication to Theoretical and Practical has been added.	Page 13; Lines 12-36
Quality of Communication	Communication needs to be improved. For instance choice of some words can be better. "These sub-challenges are integral parts of the main challenge and must be completed to accomplish it." (p4.l16-17). Instead of saying challenges to be completed it would be appropriate to say that these challenges should be addressed	Thank you for your feedback. As per your suggestion, the word "accomplish" has been replaced with "addressed". Furthermore, a thorough proofreading was carried out to improve the overall communication and the standard of the manuscript.	Page 6; Line 40

Reviewer 02			
Recommendation: Accept			
	Reviewers comments	**Authors comments**	**Page**
General	The issue is well explained. Authors explained the importance of integrating the digital technologies or tool to higher education learning and teaching. Authors have highlighted several challenges which to be discussed in this paper. I am satisfied with the practical contribution but not on the theoretical contribution. What is the novelty of this paper? We know that there are many studies have discussed the integration of digital technologies into higher education and its challenges, pros and cons. This has been researched for more than a decade. Thus, authors may need to clarify further what make your paper so unique as compare with other articles.	We have updated the theoretical implications, which we believe further clarifies what makes our paper unique compared with other articles.	Page 13; Lines 19-31
Originality	1. By discussing or identify these challenges, what are your ultimate objectives? Since the context of the study is UK, then the introduction should be reflected to UK context as well. 2. Please follow the suggested flow: (1) Provide a brief overview of the current issue and its significance. (2) Explain the importance of addressing the identified research gaps. (3) Establish the connection between the research gap and the current issue. (4) Justify the significance of exploring the underexplored aspects addressed in the study. (5) Review any similar studies conducted previously. (6) Highlight the unique aspects of the study compared to past empirical research. (7) Clearly state the research objectives. (8) Outline the contributions of the study to the field. This structured approach will enhance the clarity and coherence of the introduction, effectively setting the stage for the rest of the paper. 3. Please check the introduction last paragraph, there is a typo- Implementing DT in H is crucial, what do you mean H or referring to HE instead of H?	1. We appreciate your feedback and have added in introduction effectively reflects the UK context to enhance the relevance and applicability of our research. 2. Many thanks for your comment. We have now structured the introduction as best as we could as per your suggestion. Some of the sections could not be included as they were discussed in the following sections. However, we trust the revised structure satisfies your comment. 3. Thank you for pointing that out. The correction has been made, and "H" has been changed to "HE" on page 3, line 45.	Page 3 lines 7-9; 12-14; 42-46. Page 3 Line 1-48 Page 4 Line 1-11 Page 3 Line 42

Relationship to Literature	I am fine with the literature review.	Many thanks for your comment.	N/a
Methodology	The methodology is presented clearly and appropriately.	Many thanks for your comment.	N/a
Results	The findings are presented clearly and analysed appropriately.	Many thanks for your comment.	N/a
Implications for research	The authors should provide valuable insights based on current practices and policies, supported by evidence from their research. To strengthen the practical implications, it is crucial to reference specific findings, data, or examples that demonstrate the validity and reliability of the recommendations. By incorporating this approach, the authors can offer concrete and actionable suggestions that have a solid grounding in their research findings. 10. Should have a standalone section for limitations and future research recommendations. Identify the weaknesses of the study and provide recommendations for future improvement.	Practical, Theoretical implication and limitations of the study has been added under heading 5.2 and 5.3	Page 13; Lines 12-36.
Quality of Communication	The paper is well written.	Many thanks for your comment.	N/a

Reviewer 03			
Recommendation:			
	Reviewers comments	**Authors comments**	**Page**
General	N/A	N/A	
Originality	The paper showcases a commendable level of originality, presenting fresh insights and significant information that undoubtedly warrant its publication.	Many thanks for your comment.	N/a
Relationship to Literature	Yes, the paper shows a good grasp of the important readings in the field and includes a suitable variety of sources. It appears well-researched and acknowledges key studies. While there might be minor omissions, the overall coverage seems comprehensive.	Many thanks for your comment.	. N/a
Methodology	Overall yes, however it should have covered in more details how the ISM approach has been adopted.	Many thanks for your comment.	N/a
Results	Yes, the results are presented in a clear and understandable way, making it easy to follow the findings. The analysis is thorough and provides valuable insights into the data. The conclusions effectively summarize the key points of the paper and connect them cohesively, demonstrating a strong understanding of how the results contribute to the overall research goals.	Many thanks for your comment.	N/a
Implications for research	The paper does not identify any implications for research, practice or society. This should be added to the conclusion.	Practical and Theoretical implications of the study has been added under section 5.2 (page 14, 16)	Page 13; Lines 12-36.
Quality of Communication	Yes, overall well-written and structured.	Many thanks for your comment.	N/a

Reviewer 04			
Recommendation: Major Revision			
	Reviewers comments	**Authors comments**	**Page**
General	Major concern Fit between methods and purpose of the study: The stated purpose of the study: "systematically dissects strategies against the challenges stalling digital transformation (DT) in the UK." However, the (1) methods seem to summarize others' research and opinion pieces instead of dissecting, comparing or testing the efficacy of any of the strategies that have been tried in field studies with the results being quantified, (2) and the explanation of the "systematic" literature review did not convince me that the literature review should be limited to research on the UK or that the approach in selecting papers was appropriately systematic. I recommend either changing the purpose of the study to better match the methods OR more clearly and explicitly demonstrating how your methods and literature review are appropriate for your purposes.	Thank you for your detailed feedback. We appreciate your insights and have taken them into consideration. To address your concerns: 1. We have revised the purpose of the study to better align with our current methods, focusing on summarising existing research and opinion pieces to highlight strategies against digital transformation challenges. 2. Additionally, the methodology section now includes an explanation of the "systematic" literature review to justify the scope and demonstrate a more rigorous and systematic approach to selecting and analysing relevant papers. We hope these adjustments will clarify the fit between our methods and the purpose of our study.	Page 4 Lines 26-46; Page 5 lines 7-32. Page 4 Lines 26-46
	Minor concerns **1.** On page 3 and 4, the case for why higher education should be transformed to use more technology was not convincing, because it overly relied on broad generalizations. I recommend replacing the broad explanations with statements that identify the mechanisms between the results of digital transformations and the student outcomes purported in the paper.	Thank you for your feedback. We have added some corrections. We hope that the broad statements are now replaced with statements.	Page 3 Line 21-24 Line 33-35 Line 37-39 Line 42-46
2	Most of section 2: Solutions are frequently proposed for potential hurdles with rather strident language before the paper shows analysis of solutions. I recommend either using more tentative language for solutions that have not be supported by strong empirical evidence and explicitly identifying the empirical evidence when declarative statements are made	Thank you for your insightful feedback. We have revised Section 3 (previously Section 2) to use more tentative language for unsupported solutions and explicitly identified empirical evidence where declarative statements are made. We have also made structural changes to the flow of argument to better present the study's findings.	N/A
3	Online teaching: My intuition for what a digital transformation in higher education is that it would include more online teaching. In other words, online teaching could not be an impediment to a digital transformation, because it is a digital transformation. At the beginning of section 2, I recommend fully defining a digital transformation so that what is and is not part of a digital transformation is clear.	Thank you for your feedback. We agree that online teaching is a crucial component of digital transformation. To clarify this, we have included a definition of digital transformation at the beginning of section 2, emphasizing that online teaching is an integral part of this broader shift. This will help to clearly delineate what constitutes a digital transformation in the context of our study.	Page 6 Line 17-20

4	"Changing educational landscape" does not clearly identify the challenges that any strategy would address. Please explicitly explain the challenge.	Thanks for your comment, we have defined Changing Educational Landscape (section 3.2.2).	Page 9 Lines 5-10
5	Justification of choice of procedure: "Research procedure" section makes many broad declarative statements on ISM being appropriate and also uses terms like "collaborative" that are not usually associated with quantitative procedures even though the results discuss correlations. I think the procedures should explain how the (1) papers are inputted into the model, (2) model analyzes the papers, and (3) variables ISM calculates are calculated as well as what those variables are and how they should be interpreted.	Thank you for your thoughtful feedback. We appreciate the opportunity to clarify our research procedure. 1. Our study is not based on quantitative methods; it incorporates qualitative (literature) aspects to provide a comprehensive analysis. 2. The key issues identified from the literature were considered when developing the key drivers. As explained in our methodology, These drivers were fed into the ISM process (isection 2.1). 3. The variables are pre-determined, interpreted, and correlated as per the usual ISM procedure, as discussed in the methodology section (Pages 5-6). We have not explained it in detail as it was not the rationale of the study, as well as keeping in mind the strict word count. However, we have now elaborated on how the literature fed into the ISM and other key aspects suggested. I trust these changes would be acceptable in regards to the above comment.	Page 5 Line 7-14 Page 5 Line 7 - Page 6 Line 3.
6	Explanation of robustness of procedures: Again, justification makes declarative statements that about the procedures that are not terribly convincing. In particular, the 3rd paragraph in the "Research procedure" section cites Janes and Gomis et al's papers but does not explain why ISM is appropriate. Moreover, the cites being limited to a few people in 2 fairly niche journals did not convince me of the strengths of robustness or appropriateness of the methods. I recommend explaining "why" the methods are appropriate for the purpose of the paper and, if possible, citing a broader variety of uses of ISM in a variety of prestigious journals.	Thank you for your valuable feedback. We appreciate your comments on the robustness of our procedures and the use of ISM. One of our citations is from a paper published in the same journal to which we are submitting. This indicates that the methodology has been previously accepted and deemed appropriate by this journal's editorial standards. However, to further justify the appropriateness of ISM, we have included other citations that help demonstrate its widespread use and acceptance in addressing complex relationships among variables in various fields. We have now elaborated on why ISM is particularly suitable for our study. ISM is an effective method for systematically identifying and analysing relationships among key factors, which aligns well with our goal of dissecting strategies and challenges in digital transformation. Also, this is the key novelty within our area of study. We believe the structured approach within the methodology on ISM allows for clear visualisation of the interdependencies	Page 5 Line 7-14 Page 5 Line 47- Page 6 Line 13

		among key drivers, providing deeper insights and robust conclusions. We hope these revisions and explanations will address your concerns and enhance the justification of our methodology.	
7	The tables and the diagram need to be better explained and should be in the "main findings" section instead of in the methods section.	Many thanks for your comment. We have now explained the diagrams further.	Page 11, line 27 to Page 12, line 10.
8	"Main findings" should be more explicit on the "correlations" it references. Correlations have a precise mathematical meaning and none of the tables show correlations.	Many thanks for the comment. Even though the term correlation has a precise mathematical definition, its use within the section is aligned with the developed ISM protocols. The term here defines the relationship between the developed drivers and their influence and reliance. Further discussion is found in section 5. We trust this clears the reviewer's comment.	Page 11, line 43 to page 12, line 10.
9	The results need to be more fully explained and interpreted. For example, the arrows in the diagram imply "Level 1" variables are the most important because they lead to Level's 2-4. Moreover, the first paragraph of the section states "level 4 being the least critical" but the 6th paragraph says "level 4 are the most critical." Results should clearly state how the levels are related and be consistent on the importance of each level. More broadly, numbers that are not in tables should be written in the prose and interpreted more.	Thank you for your comment. We have now revised the text with a more detailed explanation and in consistent with the levels presented within the level partitioning diagram. We trust this improved the readability and clarity of the presented illustrations.	Page 11 line 43 to page 12, line 10.
Originality	Please see review.	Many thanks for your comments; they are addressed as appropriately above.	N/A
Relationship to Literature	Please see review.	Many thanks for your comments; they are addressed as appropriately above.	N/A
Methodology	Please see review.	Many thanks for your comments; they are addressed as appropriately above.	N/A
Results	Please see review.	Many thanks for your comments; they are addressed as appropriately above.	N/A
Implications for research	Please see review.	Many thanks for your comments; they are addressed as appropriately above.	N/A
Quality of Communication	Please see review.	Many thanks for your comments; they are addressed as appropriately above.	N/A