

Digital Realities as Tools to Enhance Blended Learning in Accounting and Auditing Education

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Abstract – The main aim of this paper was to critically analyse the merits, demerits, of digital realities in blended learning in accounting and auditing education. This paper adopted qualitative research method which based on content analysis of existing literature performed. This article used a selective bibliography of articles published between 2019 and 2023. A total of 34 articles were selected for this research study from 486 identified through database searches. Preferred Reporting items for Systematic Reviews and Meta-Analysis (PRISMA). Data gathered was entirely analysed and presented using themes. The study's findings revealed potential boundaries and limitations as well as potential advantages of digital realities in enhancing accounting and auditing education. We argue for a different educational ecology which provide a robust mixed reality educational framework to enhance blended approach to learning sustainability of accounting and auditing education in digital world. This study contributed the current body of knowledge by providing valuable insights into challenges and opportunities of accounting and auditing education in the metaverse world for educators, students, academia and policymakers. This study offers a dialectical vision for revolutionising accounting and auditing education.

Keywords - New Technologies, Accounting and Auditing Educational Ecology, Mixed Reality, Virtual Reality and Augmented Reality

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1 Introduction

A robust debate among scholars on the utilisation of traditional chalk and talk teaching approach (face to face) and the use of technological devices for teaching and learning activities (remote) under the banner of the fourth and fifth industrial revolutions is currently occurring (Al-Gnbri, 2020). Aleksandrovich *et al.* (2022), argue that firms are currently facing tremendous challenges due to digital technologies. Blended learning, also known hybrid learning, is according to (Suryono *et al.*, 2023), an instructional approach that combines traditional face-to-face classroom teaching with online learning experiences. Suryono *et al.* (2023) further note that blended approach integrates in-person interactions, such as lectures and group discussions, with digital resources, such as webinars, videos, interactives modules, and digital realities. Lee & Hwang (2022) emphasized the crucial role of understanding of metaverse prompted by technology especially artificial intelligence (AI) in e business environment. Al-Gnbri (2022) pointed out that, the metaverse which is digital reality that consolidates aspects Augmented Reality (AR), virtual reality (VR), online games, social media, cryptocurrencies and blockchain significantly assist users to interact virtually.

Yılmaz & Malone (2020) argue that Virtual and Augmented Reality is the one of powerful strategy that can be used in higher education to prepare potential Lecturers (PL). Yılmaz & Malone (2020) add that, several tools such google and flipped classrooms, Moodle, Edmodo and Virtual and Augmented reality technologies are being used to through online teaching and learning. In their research, Sudirman *et al.* (2020) found that augmented reality is one of the newest technologies used for online instructions, commonly applied in education to facilitate teaching and learning process within and outside for classroom. This because, according to Gonzalez Vargas *et al.* (2020), AR simultaneously combines digital transformation and physical objects. However, Gonzalez Vargas *et al.* (2020) argue that the VR and AR application in the classroom faces various issues and obstacle, such as inadequate infrastructure, limited research on educational impact and integration of VR and AR with the curriculum.

Kim *et al.* (2022) note that, the accounting filed is undergoing tremendous revolution as big data analytics and artificial intelligence (AI). However, scholars such as Gulin *et al.* (2019) and Kroon *et al.* (2021) argue that technologies are already performing and handling the Jobs accountants and auditors used to do. Holmes & Douglass (2022) further argue that technologies continue to reduce companies' heavily reliance on accounting professionals. But however, as far as accounting education literature that dealt with the subject of metaverse is concerned, additionally, potential privacy, ethical, security concerns that affect creating opportunities for remote setting have not received enough research attention the researcher failed to obtain them and therefore, it can be concluded that there are no prior studies in the field of accounting and auditing that dealt with the topic in question (Holmes & Douglass, 2022, Carvalho & Almeida, 2022).

Furthermore, it has been globally acknowledged that the use of virtual and augmented realities in accounting education within higher education

institutions has not been expansively explored (Sala, 2021, Elmqaddem, 2019, Lee *et al.*, 2022). There has been a mixed finding whether or not VR and AR are disruptive in the accounting field (Saerang *et al.*, 2023, Han *et al.*, 2023). Expanding the potential relevance these technologies has also brought about high demands for innovative solutions in addressing accounting education needs (Granić & Marangunić, 2019, Sagnier *et al.*, 2020).

Digital revolution started in the third industrial revolution with the development of a computer and the developments became rapid in the fourth industrial revolution (4IR) with artificial intelligence, robotics, machine learning and internet of things taking the lead amongst other developments. Scholars argued that VR and AR are not new as they were first created in 1970 at the University of Utah by Daniel Vickers (Sala, 2021, Elmqaddem, 2019, Lee *et al.*, 2022). But however, Gqokonqana *et al.* (2022) argue that many challenges and constraints such as costs, content development, safety concerns, lack of training among teachers and technical limitations among others prevented these technologies from being used by education systems.

Gqokonqana *et al.* (2022) further note that COVID 19 is the robust trigger for drastic push from traditional teaching (face-to-face) to urgent remote teaching and learning no University is immune to this reality. Besides the advancement of new technologies, globally, basic and higher education institutions were unprepared in dealing with the heightened threats brought by the COVID 19 pandemic in early 2020 (Hassan, 2021, Mseleku, 2020). Narin (2021) did a research on a content analysis of the metaverse articles, Narin (2021) study aimed to analysed the content of articles containing the keyword “metaverse” in all fields. The author examined forty (40) scientific articles published in refereed journals. But however, none of these articles dealt with the field of accounting and auditing education, accordingly the research gap covered by this research.

Whether or not virtual reality and augmented reality directly or indirectly enhance the blended approach to teaching and learning in accounting and auditing education is highly debated (Egiyi, 2022, Al-Gnbri, 2022, Yaşar, 2022). This empirical question for investigating the merits and demerits of virtual and augmented realities in enhancing blended approach to teaching and learning in accounting education motivates the current research builds on gaps in the attendant literature and it holds the centre stage in scientific inquiry leading HEIs to fully embrace blended accounting and auditing education. The overall intent of this study is to analyse whether digital realities are tools to enhance blended learning in accounting and auditing education. The two interrelated research objectives were formulated:

- i. To critically assess the critical opportunities of using digital realities as tools in enhancing blended learning in accounting and auditing education.
- ii. To critically assess the critical challenges of digital realities as tools in enhancing blended learning in accounting and auditing education.

The remainder of this article is structured as follows: the next section describes explores the applications of VR and AR in accounting and auditing education, followed by the literature review and methodology sections, results discussion and conclusions are discussed in the last sections.

2 Literature Review

This literature review aims to provide an overview, on the application of virtual reality and augmented reality in accounting and auditing education because the rise of technology has revolutionised the accounting profession, making digital accounting crucial among both accounting students and professionals (Don *et al.*, 2023). Digital accounting literacy which is the ability to use digital tools and technologies to understand, process, analyse, interpret and report financial data, has been identified by Egji (2022) as a potential tool in ensuring that accounting graduates are employable in the current and future digital era of accounting professional. However, Tavares *et al.* (2023) argued that there are concerns about the practical relevance of the accounting curriculum and the lack of exposure to real-world accounting practices among accounting students within universities. Zin *et al.* (2022) suggested that, utilising digital realities in accounting and auditing education. Similarly, Surianti (2020), highlighted the need for digital accounting and auditing education to be more practical and relevant to the real-world accounting and auditing practices. The lack of necessary practical skills and knowledge to adapt and adopt the changing demands of accounting and auditing profession has been echoed by both Low *et al.* (2016) and Ghani & Muhammad (2019) who also found that employers expressed a serious concern about lack of practical skills and the need for graduates to be equipped with digital accounting and auditing skills.

In their research, Buckless *et al.* (2014), Al-Hattami (2021) and Xiu & Yunli (2021) concluded that simulation based-learning in accounting education provides graduates with hands-on experience for practical application of course content using digital realities and technologies. Gotthardt *et al.* (2020) found that virtual reality and augmented reality serve as crucial input for the current and future accounting and auditing curriculum revisions. Similarly, Kelly *et al.* (2023) found that virtual labs could potentially be used to train accounting and auditing students practical skills, invoicing, inventory, performing audits and financial statements preparation. In their study Sahoo & Swain (2020), revealed that virtual and augmented realities can potentially improve remote accounting teaching and learning experience. Briscoe *et al.* (2020) study findings revealed that virtual and augmented realities provide accounting students with the ability and capability to better learn, interpret and analyse financial statements through virtual mediator.

Tabibi Rad *et al.* (2022) further found that virtual teaching methodology provide lecturers with the great opportunity to better teach, interpret and analyse accounting programs. Tabibi Rad *et al.* (2022) recommended that in order to expose accounting students to the real-world and working life, and also prepare present graduates for the relevant digital future and labour market, accounting programs within universities are required to incorporate and leverage digital technologies for accounting applications. In the same vein, Polo *et al.* (2023), recommended that the existing traditional accounting curriculum should be reviewed to ensure practice to theory and theory to practice teaching philosophy is balanced. Radiah *et al.* (2023), suggest that the digital technologies in the current accounting education should be strongly encouraged

to support learning development of accounting students. Qadir (2023), concluded that, to stay up with evolving customers' needs, the universities should embrace virtual and augmented realities in their accounting education.

Similarly, Qasim *et al.* (2023), caution that, the lack of exposure to digital accounting skills among accounting students, could negatively impact accounting graduates' employability, as today's employers required graduates to be fully equipped with digital accounting skills. Qasim *et al.* (2023), argue that, despite great benefits of using digital realities in accounting education, leveraging on these technologies in accounting education is still limited. highlighted the issue of limited integration of digital realities in accounting curriculum. Tavares *et al.* (2023) soundly argue that accounting educators face several obstacles or challenges teaching digital accounting, these included but not limited to: (1) rapid advancement of technology, the lack of resources to support digital accounting education, and the skills gap in digital accounting education among others. Tsiligiris & Bowyer (2021), suggested that Universities and accounting educators, should collaborate with big 4 accounting companies that have already integrated digital tools into their audit and accounting consulting process, so that the students can learn from practice to theory and theory to practice vice-versa (Zolkifli *et al.*, 2022).

2.1 Relevant Theoretical Frameworks

This study depends on these theoretical assumptions that justify the merits and demerits of digital realities in enhancing blended learning in accounting and auditing education. Empirical research associate with the merits, demerits, of digital realities in addressing the challenges for accounting education in blended learning have been conducted based on the five theories: Technology Acceptance Model, unified theory of acceptance and use of technology (UTAUT). Theory of change (Ma and Huo, 2023), constructivism learning theory, and disruptive technology theory which was propounded by Bower and Christensen (1995) and updated Denning (2016) and the scholars argue that entities which stay ahead of their industries do massively invest in incremental and other times radical technological approaches to be able to meet the future generational needs. The following sub-sections discussed these theories and explained the challenges and opportunities of adopting and implementing blended approach to teaching and learning in accounting and auditing education in metaverse world in terms of each theory.

2.2 The disruptive technology theory

Bower & Christensen (1995) described the trajectory of disruptive technologies as follows: (1) disruptive technologies often start as a low performing technology, (2) disruptive technologies do not meet the current requirements of the mainstream market, (3) but with time, once expected trajectory performance keeps rising faster that the performance of required by mainstream market, (4) the innovative technologies will trigger a disruption and eventually attract the mainstream customers. The disruptive technology theory was thus considered relevant and appropriate for this research study for the following

reasons: firstly, the theory is crucial for both regulators and educational institutions with regards to the adoption of mixed reality and influence of the traditional and flipped Classroom to Bloom's Taxonomy. Secondly, the layering mechanism, where new technologies are typically expected to destabilise existing traditional system but has potentialities to track a broader pattern of mixed reality and push for the broader change by layering delivery systems. Therefore, potential boundaries and limitations as well as potential advantages of digital realities in accounting education need to be recognised. Finally, the theory, explain in fuller detail the strategies by to be employed by revolutionalising accounting and auditing education.

2.3 Theory of change

Ren & McGuckin (2022) defined a theory of change as a theory of how and why an initiative works. Ren & McGuckin (2022) further state that a theory of change to comprehensive community initiatives evaluation as a cumulative and systematic study of the links between activities and outcomes and context of initiative. Articulating the theory of change, Reinholz & Andrews (2020) subsequently described the following three attributes of good the theory of change as: (1) it should be plausible, (2) doable, and (3) testable. Keary (2023) noted that the theory of change has been widely used in the areas of teachers, education, policymakers, principals, curriculum coordinators and other key role players heavily involved for developing and evaluating educational programs for educators. Other scholars such as Al-Gnbri (2022) and Qadir & Alwardat (2023) advocated the practicality of applicability of theory of change in educational program reforming, planning through digital reality and a detailed illustration and demonstration of real-life case scenarios thereby enhancing the quality of educational programs. Ren (2022) concurs adding that the theory of change stimulates the quality of teaching learning and educational research to help the planning evaluation of educational programs reforms, and change projects. The theory of change is thus considered relevant and appropriate for this research study because academics need to relate academic contents to real-life case scenarios or case studies so that for students in the second life platforms can increased their educational experiences and performance.

2.4 Constructivism Learning theory

Waite-Stupiansky (2022) state that constructivism learning theory was first propounded by Jean Piaget back in 1960s and 1970s. Waite-Stupiansky (2022) further argue that effective learning is not achieved from repeatedly replicating the information supplied by lecturers. Hof (2021), concur with Jean Piaget's constructivism learning theory and add that an effective learning is centered around student discovery learning process "Learning by Doing". Silva (2018) further found the significant relationship between educational technology and constructivism learning theory through digital technologies. Mostyn (2012) as cited in Mahambo (2020) uncovered that learning is highly mastered with the support of using innovative ways technologies by educators. Subsequent literature by Muhajirah (2020), largely supports the

development and implementation of educational technology and provide evidence that the genesis of constructivism learning theory are firmly linked to technologies and programming. Jack & Higgins (2019) agree with Ouyang & Stanley's (2014) views stating the relationship between subject and object and equilibrium between assimilation and accommodation "assimilatory and accommodatory". Constructivism Learning theory is thus considered relevant and appropriate for this research study because the students feel empowered and engaged as they have control over the learning process (Dede, 2005). The constructivist learning theory explains in fuller detail the strategies on how students can learn experientially and proceed at their pace since according to Fernando & Marikar (2017) students explore a virtual environment, preventing situations where students are left behind during the lecture and spend the rest of the class trying to catch up.

2.5 Technology Acceptance Model (TAM)

The TAM is a widely used theoretical framework in the field of information and technology adoption, healthcare, education and e-commerce and according to Sagnier *et al.* (2020), it has been propounded by Davis (1989) who note that the Technology acceptance model seeks to explain and predict the factors influencing individuals and corporate's acceptance to new technologies. Al-Adwan *et al.* (2023) concur adding that the TAM suggests that perceived usefulness and perceived ease to use are the key fundamental factors of the user's genuine intention to adopt a particular new technology which turn affects people actual usage. Numerous studies such as Na *et al.* (2022) validated the effectiveness of TAM in predicting and enhancement of performance and productivity. In the same vein, Aburbeian *et al.* (2022), state that TAM aids in the prediction of technology acceptance based on the constructs of perceived usefulness; perceived ease of use; attitudes; and behavioural intention.

TM2 is extended to TM and it outlines two processes, the social influence process (subjective norm, voluntariness, and image) and cognitive instrumental process (job relevance output quality, results demonstrability, while the intention to use is affected by subject norm (Hamutoglu, 2020). The TM3 is also extended version to TM2 and it includes not only the original TM2's constructs, but also adds the constructs of anchor (computer anxiety, perceptions of external control, computer self-efficacy and computer playfulness) .Therefore, the TM3 utilises multiple items scales to measure the above mentioned constructs, which is mote reliability than a single scale (Yazdanpanahi, Shahi, Vossoughi, & Davaridolatabadi, 2024).

Technology Acceptance Model is thus considered relevant and appropriate for this research study for the following reasons: firstly, the theory both regulators and educational institutions with regards to the adoption of blended approach and influence of the traditional and flipped Classroom to Bloom's Taxonomy. Secondly, the layering mechanism, where new technologies are typically expected to destabilise existing traditional system but has potentialities to track a broader pattern of mixed reality and push for the broader change by layering delivery systems. Therefore, potential boundaries and limitations as

well as potential advantages of digital realities in accounting and auditing education need to be recognised. Finally, the theory, explain in fuller detail the strategies by to be employed by revolutionalising accounting education.

2.6 Unified Theory of Acceptance and Use of Technology (UTAUT)

Despite the widespread use of TAM, Malatji *et al.* (2020), note that, this model has been soundly criticised for its focus on individuals' beliefs, attitudes and some instances overlooking social and contextual factors influencing technology adoption. Scholars continue to expand the model to address these limitations. For instance, in their research, Venkatesh and Davis (2000), the authors extended the TAM propounded by Davis (1989) by incorporating cognitive instrumental process, social influence resulting in the unified theory of acceptance and use of technology (UTAUT). Donmez-Turan (2020) hold a view that the social and organisational fundamental factors that can potentially impact technology acceptance beyond individual perceptions.

Venkatesh & Bala (2008) propounded the TAM3 model by incorporating the impact of external variables to provide a more robust and comprehensive understanding of technology acceptance. The unified theory of acceptance and use of technology and its extensions like UTAUT2 are also fast becoming leading theories to studies that focus on value, acceptance and use of digital technology products, services and platforms in several fields (Chatterjee *et al.*, 2021, Arain *et al.*, 2019). Venkatesh *et al.* (2003) in their empirical tests identified performance expectancy, effort expectancy and social influence as the three direct factors of behavioural intention in technology use. Venkatesh *et al.* (2003) found facilitating conditions and contingencies such as gender, age, experience and voluntariness would also alter the effect of the factors on the behaviour or intention. Unified Theory of Acceptance and Use of Technology is thus considered relevant and appropriate for this research study for the following reasons: firstly, the theory is crucial for both regulators and educational institutions with regards to the adoption of mixed reality and influence of the traditional and flipped Classroom to Bloom's Taxonomy. Secondly, the layering mechanism, where new technologies are typically expected to destabilise existing traditional system but has potentialities to track a broader pattern of mixed reality and push for the broader change by layering delivery systems. Therefore, potential boundaries and limitations as well as potential advantages of digital realities in accounting education need to be recognised. Finally, the theory, explain in fuller detail the strategies by to be employed by revolutionalising accounting education.

The argument in favour of virtual and augmented realities has been advanced by Gudoniene & Rutkauskiene (2019) who stated that digital realities have been widely welcomed and adopted in all domains including education. Gudoniene & Rutkauskiene (2019) further state that virtual reality is achieved by the application of special computer technology most commonly headsets that gives an impression of reality. Lampropoulos *et al.* (2022) concur adding that virtual reality utilises virtual reality modelling language (VRML) or programming language to build up three-dimensional (3D) graphics and the associated user interactions. Jumani *et al.* (2022) note that the users of virtual

reality typically use a head-mounted or hand-held controller to connect to the virtual reality and navigate in virtual world. While, according to AlGerafi *et al.* (2023), augmented reality system combines a physical real-world scene with a computer-generated virtual scene that adds to the scene with additional details. Al-Ansi *et al.* (2023), further allude that, augmented reality maintains equilibrium between the benefits of actual reality and the flexibility of virtual presentations.

Empirical evidence, metaverse (digital realities) could potentially enhance blended learning approach to teaching and learning into accounting education (Spanò *et al.*, 2022, Al Gnbri, 2022, Lindawati *et al.*, 2023, Mishra & Awasthi, 2022, Pandey & Gilmour, 2023). However, criticisms ranging from pointing out that demerits and challenges associated with their use. Al Gnbri (2022) notes that virtual reality as a technology based on dropping realistic objects into a virtual environment which stimulate individuals to feel as if they are in the real world.

Al Gnbri (2022) further argues that virtual reality is done through an interactive of the three-dimensional environment created by computers programs. Bhaskar & Flower (2021) soundly argue that accountants' auditors are guided by international financial reporting standards (IFRSs) and general accepted accounting principles, and International Standards on Auditing (ISA) depending on accountants and auditors' geographical region. Bhaskar & Flower (2021) hold a view that GAAP and IFRS should be harmonised with the shape of the financial and international business environment. Bhaskar & Flower (2021) also went further and posed the logical question about the extent to which these divergent standards is with the digital realities and technological advancements in the metaverse world. Egnyi (2022), concur with Bhaskar & Flower (2021) views and argue that international accounting standards are not in harmony with digital world or metaverse world and recommend that in order to achieve this new digital world in a balanced way, international professional accounting and auditing bodies should harmonise accounting standards.

Another criticism came from Sari *et al.* (2023) in their research, is that although digital realities (virtual repositories) for students in the second life platforms increased their educational experiences and performance. However, more than 15% experienced the negative psychological reactions when students wear virtual reality glasses and headsets. Sari *et al.* (2023) predicts this percentage to increase as the advancement of techniques and the increase in the use of digital realities.

Skulmowski (2023) further criticises and argues that metaverse world rose potential ethics dilemmas and data privacy concerns. In contrast, Mancuso *et al.* (2023) argue that personal information in digital realities or metaverse world can virtually last longer after the death of the person in the physical world.

Mishra & Awasthi (2022) further soundly criticise that digital realities and outlined key challenges which includes but not limited to: (1) isolation and reduced social interaction, (2) lack quality content and educational effectiveness as poorly designed or irrelevant content can undermine the educational effectiveness of these digital tools, (3) potential distraction as students may be attempted to explore unrelated content and become disengaged, (4)

financial barriers as the implementation of metaverse world requires significant investment in hardware, software and training, and (5) accessibility disparities as not all students may have access to appropriate devices and high speed internet required for a seamless digital reality experience. Mishra & Awasthi (2022) also point out that this can exacerbate existing socio-economic disparities in education.

Stanoevska-Slabeva (2022), grouped empirical literature on the demerits of digital realities into seven areas: (1) technical glitches which can disrupt and frustrate both students and lecture, (2) integrating digital realities into curriculum may require teachers and students to acquire new skills which can be time consuming (3) prolonged use of digital reality devices potentially lead to physical and health issues such eye strain, headaches, and motion sickness, (4) data privacy and safety concerns, (5) Laws and regulations issues, (6) intellectual property issues, (7) and social challenges. This was also confirmed by the research and articles linked to metaverse word and education in various disciplines (Zadorozhnyi *et al.*, 2022, Al Gnbri, 2022, Lindawati *et al.*, 2023, Spanò *et al.*, 2022).

2.7 The mixed reality education-based conceptualised model

Guided by research objectives and prior scholars such as Moore and Felo (2022), Al-gnbri (2022:32), Egiyi (2022) and Polo *et al.* (2023), the researcher developed a mixed reality education-based conceptualised model or framework that can be used for improving milestones in improving digital education technology in the field of accounting and auditing. The two directional arrows indicate that the relationship between the physical/real world or environment and virtual/digital or metaverse world in question allowing blended or hybrid approach to teaching and learning in accounting and auditing field which requires eminently practical approach with mixed pedagogical approaches. Figure 2 depicts the mixed reality education-based conceptualised model that forms the foundation of this research study. This conceptual model illustrates the interplay and connections among the independent variables and dependent variables demonstrating how these fundamental factors relate to each other. The proposed research framework included two major factors that influence the blended approach to teaching and learning in accounting and auditing education (independent variables) namely physical/real world or environment and virtual/digital or metaverse world and the dependent variable in this study is blended approach to teaching and learning in accounting and auditing education measured by the factors of mixed reality in accounting and auditing education. The two major factors are also aligned with the elements of disruptive technology theory. The mixed reality education-based conceptualised model is illustrated in the Figure 2.

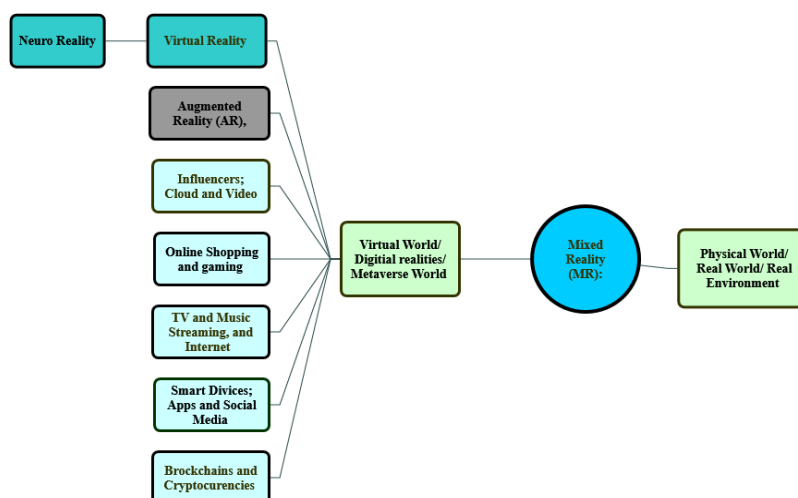


Figure 1: The mixed reality education-based conceptualised model

Source: Authors' compilation (2024)

3 Methods and Data

As highly recommended by Page *et al.* (2021), this study adopted Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA). The PRISMA is composed of 34 evaluation items (checklist) that represent a minimum set of relevant information to convey in a systematic review report, covering the rationale for review, databases used to identify potential studies, results of meta-analyses performed and the implications of review results, and the flow chart with four main strategic blocks or steps namely: (1) selecting of research and objective of the study and outline the question(s) for review, (2) design of inclusion and exclusion criteria, (3) study identification, (4) screening and studies quality valuation, (5) eligibility, and inclusion, (6) extraction of data, and (7) synthesising of data (formulate a brief evidence for the results) and interpret them. This method provides a robust structure to assist researchers report on systematic reviews and meta-analyses (Page *et al.*, 2021). In line with Rajkoomar *et al.* (2022) recommendation, PRISMA was utilised to scan the literature review in the last five (5) years on the merits and demerits of digital realities in accounting and auditing education.

The following steps were thoroughly followed for the two study's objectives.

Step 1: Identification of research objectives/questions: The research objectives which guided the study is: to critically analyse the merits and demerits of digital realities in enhancing accounting and auditing education justified by the existing theories and empirical literature that contribute to the blended approach to teaching and learning in accounting and auditing education through mixed reality.

Step 2: Identification of relevant studies: Having identified the research objectives/questions, the researcher proceeded to identify previous studies

considered relevant to the research (See selections of Publications and PRISMA diagram flow).

Step 3: Study selection: The studies selected can be clearly seen in the figure 2.

Step 4: Charting data: In line with Arksey & O'Malley (2005) the data charting form was used for 34 articles which formed the final corpus of the literature use for the study (see Figure 2).

Step 5: Collating, summarising and reporting results: As recommended by Arksey and O'Malley (2005), thematic construction is needed to present a narrative account of existing literature. Thus, for the purpose of this research, themes were created and consequently used as a guide to provide answers to the questions/objectives of the study. Themes are presented in the discussion sections (7.1 and 7.2).

Selections of Publications: The exclusion criteria (EC) and inclusion criteria (IC) are used to exclude studies that are not relevant to answer the empirical research question.

3.1 Study Selection, Inclusion and Exclusion Criterion

3.1.1 Inclusion Criteria.

The inclusion criteria for this study focused on all theories and empirical studies that examined the role and challenges of digital realities (VR/AR) in accounting and auditing education. The systematic retrieval process used a number of search strings, namely “virtual reality”, “Augmented reality”, “Metaverse world”, “Mixed reality” “metaverse world and accounting and auditing education”. Searches were conducted between 2019 and 2023 and only articles published in English language were considered for this study.

3.1.2 Keywords Analysis

The search strategy incorporated a combination of relevant keywords and Boolean operators. Among frequently used keywords are: “digital realities”, “virtual and augmented reality”, Mixed reality, metaverse world and accounting and auditing education”, and related items. Article date found on other keywords that occur overlap. The search fields and research query are defined as follows:

- **Search fields:** Title and Keywords as cited above;
- **Search Strings as cited above;**
- **Search filed:** Abstract.

3.1.3 Exclusion Criteria (EC)

Articles published in French and other languages other than English were excluded from the search. The ECs are used to filter the irrelevant articles from the sources in terms of format, publication details and access. These are defined criteria:

- EC1: All articles published before 2019 were excluded from this study;
- EC2: the work of research study is not published as a scientific article;
- EC3: the article is not part of the computer science era;
- EC4: The paper is not written in English;

- EC5: The article without an abstract;
- EC6: The article is a duplicate.

The aims of the study were used to determine the eligibility of articles to be for the study. Our search started May 26 2023 and 1065 articles were discovered in the early search in the topic field. This study advanced the search field by investigating the subject item, domains and timeframe selected, title, and abstract. This modification produced a total of 486 articles. The study's authors autonomously arranged and examined the articles based on the abstracts to maintain consistency. Abstracts were evaluated for significance and included only those that meet the inclusion criteria (peer reviewed articles focusing on digital realities in accounting and auditing education, empirically and theoretically). The researcher, examined the full texts when abstract did not depict the article's content. After the primary screening, 310 articles were found ineligible and excluded since their focus or themes were unrelated to the digital realities in accounting and auditing education. Furthermore, 123 articles were excluded based on refinements and further refinements as they were not peer-reviewed articles. This modification produced a total of 53 articles. A considerable number of articles did not include given name of the authors within article metadata but only abbreviation, to address this issue an API called API metadata retrieval is used to extract extra data information based upon Digital Object Identifier (DOI) of the articles. Finally, we deleted 19 duplicates from the database and a final list of 34 full articles aligned with the objectives of the study, thus forming the basis of the analysis. The PRISMA process is diagrammatically presented in the Figure 2. Mapping theories for demerits and merits of digital realities in enhancing blended learning in accounting and auditing education are discussed from section 2.2 to 2.6.

Selected Databases: The search process was carried using search engine to get relevant articles, Numerous databases were searched including Google Scholar, ACM, Science direct, Pro Quest and Scopus, Emerald, Taylor and Francis online, EconLit and Business Source Premier through internet. Databases were searched using a single search strings or multiple search strings with a combination of Boolean operators, namely "and", 'OR' and 'NOT' Relevant related literature and articles used for this research were then extracted from the cited above databases. The researcher decided whether the data found was suitable or not. A study is eligible to be selected if the data used is only related to digital realities and accounting and auditing education. Gathered data was analysed to show and map the theories and merits and demerits of metaverse world in accounting and auditing education. A systematic literature review (SLR) research is carried out for various purposes, including to identify, review, evaluate and interpret available research on the topic area phenomenon of interest (Clark *et al.*, 2021).

Data Validity: To ensure the validity and credibility in this research study, only peer-reviewed articles were considered.

Data Analysis: Data gathered was entirely analysed and presented using themes.

PRISMA diagram flow: PRISMA diagram flow of literature retrieval on the merits and demerits of digital realities in enhancing blended learning in accounting and auditing education is set out in Figure 2.

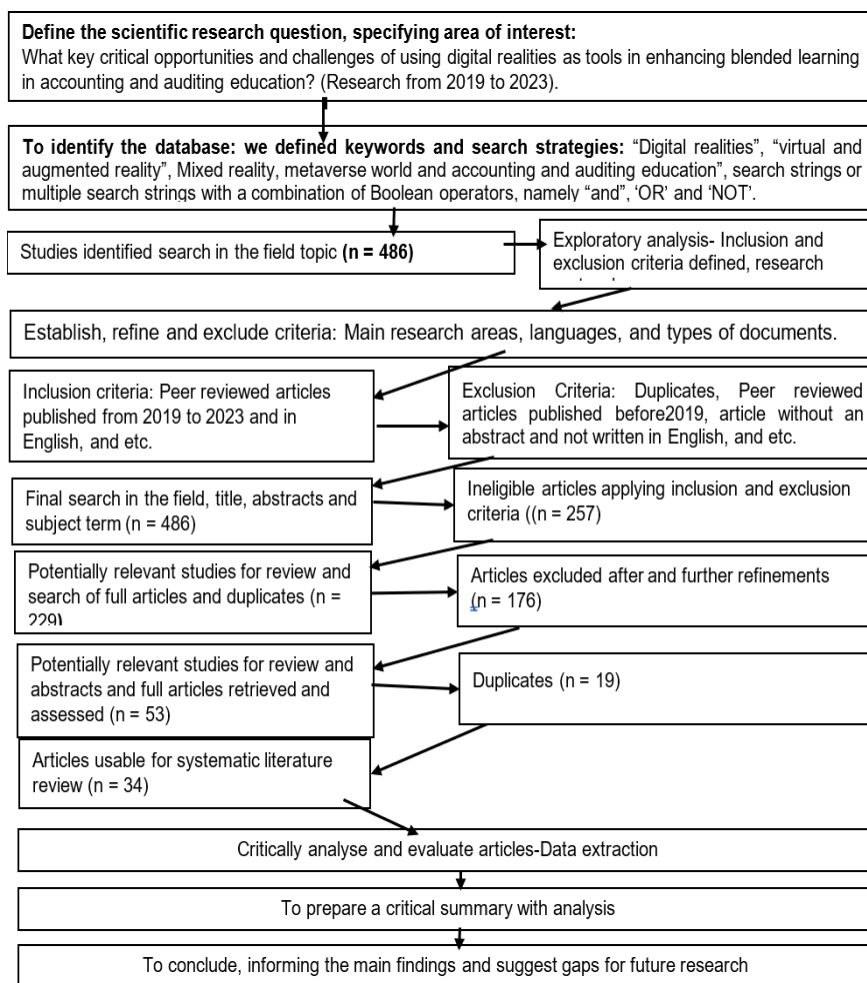


Figure 2: PRISMA diagram flow of literature retrieval

Source: Authors' compilation (2024).

The Figure 3 shows the logic using the PRISMA methodology how 34 articles were selected for this research study from 486 identified through database searches. Table 1 provides finer details of the 34 selected articles and discussion and selected articles by country can be seen in Figure 4.

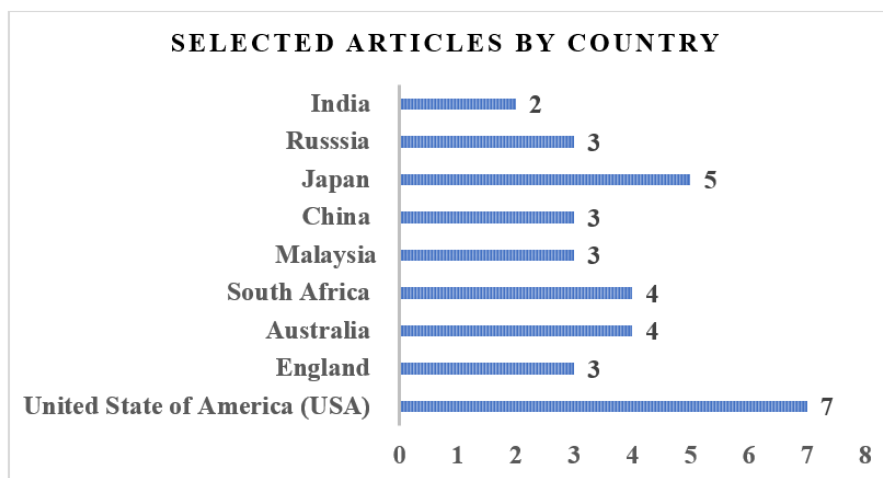


Figure 3: Selected articles by countries

4 Research Results

The results are fundamentally based on the review outcome of the prior 34 published studies in the area of digital realities and education. We will discuss first the demerits or challenges of digital realities in enhancing blended learning in accounting and auditing education followed by the merits or opportunities of using the digital realities (VR and AR) in enhancing blended learning in accounting and auditing education. The scholarly discourse on the first theme in table 1 and 2 below present the studies that support the analysis to the research objectives as shown in the introductory section. After critical reading and analysing the articles presented in tables, the researcher tried to match the articles and papers with the objectives formulated, as presented in the last column of the table that is, Objective 1- to critically assess the critical opportunities or opportunities of using the digital realities (VR and AR) as tools in enhancing blended learning in accounting and auditing education, and the objective 2- to critically assess the critical challenges of using the digital realities (VR and AR) as tools in enhancing blended learning in accounting and auditing education. The systematic literature review is presented below, trying to achieve the objectives formulated and set.

Table 1 details of the Thirty-Four (34) Selected Articles on Merits and demerits/ Challenges and opportunities of digital realities as tools to enhance blended learning in accounting and auditing education.

Table 1: details articles (Research results) in on merits or opportunities of digital realities as tools to enhance blended learning in accounting and auditing education

Areas	Merits/ Opportunities of using the VR and AR as tools to enhance blended approach to teaching and learning in accounting and auditing education.	Relevant references
Realistic simulation	Virtual world provides realistic simulations of financial scenarios enabling students to apply accounting principles in a simulated business environment. This hands-on experience in bridging the gap between theory and practice in accounting.	(Egiyi, 2022, Kim et al., 2022, Contreras and Mayorga, 2019)
Interactive learning (immersive case studies and interactive financial models)	Digital realities enable the design of immersive case studies where students can actively engage with financial data, critically analyse scenarios and make informed decisions thereby fostering critical thinking. Students can also interact with 3D financial models and visualizations, gaining deeper insights of financial concepts and business transactions.	(Bhaskar and Flower, 2021, Krajčovič et al., 2022)
Virtual auditing	Digital realities can simulate auditing scenarios useful for teaching which provides students with great practical experience in auditing processes, risk assessment and compliance checks. Virtual world can also assist to train students in fraud detection techniques allowing them to identify potential discrepancies in the financial statements.	(Al Gnbri, 2022, Lindawati et al., 2023, Appelbaum and Nehmer, 2020)
Global collaboration (collaborative projects and International accounting practices).	Metaverse learners are 40% highly confident than learners in classrooms Metaverse learners are 35% highly confident than learners using electronic tools with regard to their ability to quickly act on what they were taught. in its report, PwC found that digital reality training boosted more than 40% of trainees' confidence, and 50% less expensive and for large audience comparing to classrooms.	(Zhang et al., 2020, Polo et al., 2023, Martín-Gutiérrez et al., 2020)
Visualisation of financial data	Digital realities allow the visualisations of complex financial data through graphs, charts and 3D models, making easier for students to effectively analyse, interpret and communicate financial information. Metaverse world, can virtually immerse themselves in financial statements allowing them to gain more intuitive skills of how different rubrics impact overall financial performance and health.	(Shamsudin et al., 2023, Qadir and Alwardat, 2023)

Blended learning	It is widely known as technological mediated instruction or mixed mode learning, it is therefore educational approach which consolidates online educational materials and opportunities for interaction online with physical classroom-based approaches. Face to face classroom practices are consolidated with computer-mediated in terms of content and delivery.	(Imran et al., 2023)
Student-Centred Learning in Digital World.	A teaching philosophy that shift the focus of instruction the from the lecturer to the student, stimulating learns' autonomy and independence by putting responsibility and duties in the hands of students. The student voice is at the heart of the to the process itself. under this teaching philosophy, is that the approach focuses on skills and practices that enable long learning and students become independent problem solvers, in so doing, digital realities are ideally tailored to students' practical needs and interests. virtual teaching methodology therefore provide both students and with the great opportunity to better learn, interpret and analyse accounting programs and to support learning development of accounting students, as the students choose what, how, and when they will learn.	(Mousa and Arslan, 2023)
Robust accounting students' employability opportunities in digital world	(1) enhancing students' technical skills, (2) offering students with necessary skills to use digital tools and technologies in accounting profession, (3) increasing accounting graduates' employability in the digital labour market, (4) preparing students in the digital world, (5) digital accounting education and digital accounting courses are essential in preparing students for digital world of accounting, and (6) simulation-based learning provides accounting students with the first hands experience in utilising technologies and digital realities.	(Don et al., 2023, Teng et al., 2019)
Auditing and accounting education	AI-based forensic audits tools allow forensic auditors to make informed decisions quickly and efficiently and students can learn by experience.	(Kwon et al., 2018)
	VR and AR both offer intriguing possibilities for new interactive applications for leaning and teaching	(Al-Hattami, 2023, Don et al., 2023)
	VR and AR play a significant role in training new breed accountants, preparing future accountants and auditors for the digital accounting work -scape	(Don et al., 2023, Kamińska et al., 2023)
	VR and VR (digital accounting education) and accounting and auditing software offer several benefits to accounting students including enhancing their technical skills and increasing their employability in the Job market.	(Shveda et al., 2021, Mundida, 2020, Nori et al., 2016)

Areas	Demerits/ Challenges of using the VR and AR as tools to enhance blended approach to teaching and learning in accounting and auditing education.	Relevant references
Technical issues	<ul style="list-style-type: none"> ▪ Digital realities devices can break or crash and the high risk of any malfunction occurring can augment as students use the devices. ▪ Internet outages, or any other disruption can prevent students from using digital realities. ▪ Digital reality tools are difficult to use which can discourage lecturers to use them in their classrooms. 	(Mosco, 2023).
Health and safety issues	<ul style="list-style-type: none"> ▪ Many Students used digital realities suffered nausea, motion sickness and headaches. 	(Sari et al., 2023, Radiah et al., 2023)

5 Discussion of the Results

The systematic literature review of literature is briefly presented below, trying to achieve the objectives already formulated. The discussion of the results is organised in the two sub-sections: (1) critical opportunities of using VR and AR in enhancing blended approach to teaching and learning in accounting education, (2) critical challenges of using VR and AR in blended approach to teaching and learning in accounting education. In terms of the specific theories employed in this study. The five most popular theories emerged.

5.1 Critical opportunities of using digital realities (VR and AR) as tools to enhance blended approach to teaching and learning in accounting and auditing education.

The findings on the first theme identified, Surianti (2020), highlighted the need for digital accounting education to be more practical and relevant to the real-world accounting practices. In their research, Buckless et al. (2014), Al-Hattami (2021) and Xiu & Yunli (2021), both concluded that simulation based -learning in accounting education provides graduates with hands-on experience for practical application of course content using digital realities and technologies. Gotthardt et al. (2020) found that virtual reality and augmented reality serve as crucial input for the current and future accounting curriculum revisions. Similarly, Kelly et al. (2023) found that virtual labs could potentially be used to train accounting students practical skills, invoicing, inventory, performing audits and financial statements preparation.

In their study, Sahoo & Swain (2020) revealed that virtual and augmented realities can potentially improve remote accounting teaching and learning experience. This strongly complements Technology Acceptance Model, Unified Theory of Acceptance and Use of Technology (Al-Adwan et al., 2023). Briscoe

et al. (2020) study findings revealed that virtual and augmented realities provide accounting students with the ability and capability to better learn, interpret and analyse financial statements through virtual mediator. This strongly supports Artificial Intelligence Device Usage Acceptance Model (AIDUA) (Ma and Huo, 2023).

Muchmore, Don *et al.* (2023) recommend that Higher Education Institutions (HEIs) should incorporate digital accounting courses into their accounting curriculum in order to produce graduates for digital labour market world. Banasik & Jubb (2021) and Jackson *et al.* (2023), grouped empirical literature on the benefits of digital accounting education into seven areas: (1) enhancing students' technical skills, (2) offering students with necessary skills to use digital tools and technologies in accounting profession, (3) increasing accounting graduates' employability in the digital labour market, (4) preparing students in the digital world, (5) digital accounting education and digital accounting courses are essential in preparing students for digital world of accounting, and (6) simulation-based learning provides accounting students with the first hands experience in utilising technologies and digital realities. This strongly supports the constructivist learning theory by Bada & Olusegun (2015) because the students feel empowered and engaged as they have control over the learning process (Dede, 2005). The constructivist learning theory explains in fuller detail the strategies on how students can learn experientially and proceed at their pace since according to Fernando & Marikar (2017) students explore a virtual environment, preventing situations where students are left behind during the lecture and spend the rest of the class trying to catch up. The next identified theme from the analysed literature reports on demerits and challenges of using the VR and AR as tools to enhance the blended approach to teaching and learning in accounting and auditing education.

5.2 Critical challenges of using the VR and AR as tools to enhance blended learning in accounting and auditing education

Criticism ranging from pointing out that demerits and challenges associated with their use. Al Gnbri (2022) notes that virtual reality as a technology based on dropping realistic objects into a virtual environment which stimulate individuals to feel as if they are in the real world. Al Gnbri (2022) further argues that virtual reality is done through an interactive of the three-dimensional environment created by computers programs. Bhaskar & Flower (2021) soundly argue that accountants and auditors are guided by international financial reporting standards (IFRSs) and general accepted accounting principles, and International Standards on Auditing (ISA) depending on accountants and auditors' geographical region. Bhaskar & Flower (2021) hold a view that GAAP and IFRS should be harmonised with the shape of the financial and international business environment.

Bhaskar & Flower (2021) also went further and posed the logical question about the extent to which these divergent standards is with the digital realities and technological advancements in the metaverse world. Egiyi (2022), concur with Bhaskar & Flower (2021) views and argue that international accounting standards are not in harmony with digital world or metaverse world and

recommend that in order to achieve this new digital world in a balanced way, international professional accounting and auditing bodies should harmonise accounting standards. This strongly complements Technology Acceptance Model, Unified Theory of Acceptance and Use of Technology (UTAUT) (Al-Adwan *et al.*, 2023).

Another criticism came from Sari *et al.* (2023) in their research, is that although digital realities (virtual repositories) for students in the second life platforms increased their educational experiences and performance. However, more than 15% experienced the negative psychological reactions when students wear virtual reality glasses and headsets Sari *et al.* (2023) predict this percentage to increase as the advancement of techniques and the increase in the use of digital realities. These results are overwhelmingly supported by a theory of change by (Ren & McGuckin, 2022).

Skulmowski (2023) further criticises and argues that metaverse world rose potential ethics dilemmas and data privacy concerns. In contrast, Mancuso *et al.* (2023) argue that personal information in digital realities or metaverse world can virtually last longer after the death of the person in the physical world. Mishra & Awasthi (2022) further soundly criticise that digital realities and outlined key challenges which includes but not limited to: (1) isolation and reduced social interaction, (2) lack quality content and educational effectiveness as poorly designed or irrelevant content can undermine the educational effectiveness of these digital tools, (3) potential distraction as students may be attempted to explore unrelated content and become disengaged, (4) financial barriers as the implementation of metaverse world requires significant investment in hardware, software and training, and (5) accessibility disparities as not all students may have access to appropriate devices and high speed internet required for a seamless digital reality experience. These results do not uphold the assumptions of the theory of change (Reinholz & Andrews, 2020). But overwhelmingly supported by disruptive technology theory (Yebi & Cudjoe, 2022)

Mishra & Awasthi (2022) also point out that this can exacerbate existing socio-economic disparities in education. Stanoevska-Slabeva (2022), grouped empirical literature on the demerits of digital realities into seven areas: (1) technical glitches which can disrupt and frustrate both students and lecturers, (2) integrating digital realities into curriculum may require teachers and students to acquire new skills which can be time consuming (3) prolonged use of digital reality devices potentially lead to physical and health issues such as eye strain, headaches, and motion sickness, (4) data privacy and safety concerns, (5) Laws and regulations issues, (6) intellectual property issues, (7) and social challenges. These results are overwhelmingly supported by disruptive technology theory (Yebi & Cudjoe, 2022). This was also confirmed by the research and articles linked to metaverse word and education in various disciplines (Zadorozhnyi *et al.*, 2022, Al Gnbri, 2022, Lindawati *et al.*, 2023, Spanò *et al.*, 2022).

5.3 Contribution to the body of knowledge. Conclusion and recommendations

This study proposed the framework model to overcome challenges brought by virtual and real world in accounting and auditing education through mixed reality education-based conceptualised model. Drawing from the existing literature, this article consolidated empirical evidence which potentially contributes to the understanding of demerits and merits of virtual and digital realities that can affect blended approach to teaching and learning in accounting and auditing education. This article found that the use of digital realities provides accounting and auditing students with new possibilities for engaging in immersive environment and interactive contents. The study further found that these immersive experiences potentially assist accounting students to learn deeply in an interactive way where students use the immersive and engaging power of mixed reality.

This article contributes to the current body of knowledge by proposing a potential paradigm shift (model) to a sustainable education framework and to merging real and virtual environment “Mixed reality), where physical and digital objects co-exist allowing the user (students) real time interaction. The current study adds to the current body of knowledge by suggesting the mix to traditional bloom taxonomy and digital bloom taxonomy and mixed bloom taxonomy based conceptualised model from higher to lower order thinking skills. Digital bloom’s taxonomy, signifies the Technology Acceptance Model, Unified Theory of Acceptance and Use of Technology and theory of change which boost education needs in higher order thinking and skills within a broader education ecosystem.

This article differs from previous literature analyses by reviewing recent contributions while focusing on an overview of the topic from perspectives of accounting and auditing education in digital world. The article also extends the debate on the possibilities of virtual reality and augmented realities technologies in supporting blended approach to teaching and learning in accounting and auditing education. This study also proposes a framework to assist all HEIs and all potential teachers to deepen their teaching and learning process within and outside classroom in accounting and auditing education. This study contributed the knowledge by providing valuable insights for practitioners and policymakers. This study proposes the use of Mixed Reality (MR) to address the demerits of digital realities in order to enhance blended learning approach to teaching and learning in accounting and auditing education.

The evidence showed that accounting and auditing education in the digital realities (metaverse world) has been long debated and the debate yielded two opposing arguments. Hence, the fundamental aim of this study was to analyse whether digital realities are tools in enhancing blended learning in accounting and auditing education. Overall the findings showed a mixture of challenges and opportunities of accounting and auditing education in the metaverse world. Here, we argue for a different educational ecology which provide a robust educational framework on blended approach to teaching and learning sustainability in digital world. The study further recommends to merging traditional and flipped classroom to bloom’s taxonomy to enhance the quality of

blended approach to teaching and learning in accounting and auditing education. The researcher recommends that the robust mixed reality education-based conceptualised model should greatly enhance the blended approach to teaching and learning in accounting and auditing education. This study adopted secondary data analysis through systematic literature review and all limitations linked to this methodology apply to this research. Hence, future research could be conducted using qualitative and quantitative approaches to overcome the limitations this study encountered. Our review on the literature examining technology acceptance theories and digital realities in accounting education was only limited to prior studies published in English. Any future study, could also consider literature published in French and other languages to fill the research gap. It is therefore recommended that further research could be conducted to measure the effect and impact of mixed reality on students and academic performance and outcomes. This study used systematic literature review design, and the associated limitations apply, hence future research could be conducted using qualitative and quantitative approaches to overcome the study's methodological limitations this study encountered. Any future study, could also consider literature published in French and other languages to fill the research gap.

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