

METaverse IN EDUCATION: A DYNAMIC CAPABILITY THEORY APPROACH

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ABSTRACT:

The rapid evolution of technology has marked a new era of possibilities including the emergence of the Metaverse, which represents a technological disruption. This **research in progress** study delves into the Metaverse implementation within the educational sector through a thematic analysis of existing literature in Information Systems to identify key themes related to benefits, challenges, and values that the Metaverse can offer. In this study, the Dynamic Capability Theory serves as a theoretical framework, emphasizing the importance of adapting to a changing environment. Results reveal that the main theme, Metaverse in education, is supported by the subthemes Metaverse for educators, Metaverse for learners and Metaverse for regulators. In addition, social, functional, and emotional values of the Metaverse are discussed. As the Metaverse continues to evolve, a collaborative effort among educators, learners, and regulators is clearly needed to ensure its inclusive and enriching integration into the education sector, preparing the new generations for the future.

Keywords: Metaverse, Benefits, Challenges, Value creation, Educators, Learners, Regulators.

I. INTRODUCTION

The technology industry is rapidly advancing, offering remarkable solutions that greatly benefit our daily lives [Lacity et al., 2023]. It is estimated that by 2027, over 40% of large organizations will have a presence in Metaverse-based projects that will have a significant impact on their revenues [Resnick et al., 2022]. JP Morgan in the financial industry and OneRare in the global food industry notably have also established a presence in Metaverse for their business. Adapting to new related technologies and introducing them can be challenging [Lacity et al., 2023]. In particular, the Metaverse is considered a combinatorial innovation since it is not a single technology [Resnick et al., 2022]. It has been considered to offer very high interpretative flexibility. Hence various contradictions or incompatible visions are proposed by different researchers and actors [Dolata and Schwabe, 2023]. It is likely that an adaptive process will be necessary to examine its benefits and address concomitant challenges. This only will ensure that the Metaverse is developed in a way that benefits society at large.

According to Lacity et al. [2023], the evolution of the Metaverse is not easy to define since there is not a universally accepted definition of the term. Some define the minimal requirement of a Metaverse as a virtual world that a user can visit with an avatar. Others define it as a futuristic three-dimensional and immersive digital universe that seamlessly connects users to any virtual world. The launch of Second Life and World of Warcraft in the early 2000s popularized the idea of virtual worlds, and since then, the technology has continued to evolve [Lacity et al., 2023]. The

Metaverse is seen as the next step in this evolution, bringing together different virtual worlds and creating a more seamless and immersive experience. The concept of the Metaverse has also evolved to include augmented reality (AR) as a key feature, which was not part of the original definition of virtual worlds. The concept of the Metaverse has evolved over time as technology has advanced and new features have been added making its presence in customer service, brand influence, training, games, events, meetings, sales, retail, and trading [Resnick et al., 2022].

Nah et al. [2022] highlight that the possibilities are endless once we have sufficient resources to implement the metaverse on a large scale. This includes the use of virtual agents to automate the delivery of teaching content and facilitate students' access to information in an educational context. Mixed Reality, a technology theme in metaverse was used by John et al. [2022] to understand its benefits and challenges to students' learning experience. It was found that interactivity, immersion, and presence are the benefits, whereas difficulty using the device, accessibility issues, and the lack of flexibility are the challenges. There are multiple perspectives through which we can examine the metaverse. We will focus on the implementation of the metaverse in the educational sector. Given its distinct nature, adapting to this technology can be challenging for many individuals. However, our analysis will delve into the benefits and difficulties that stakeholders must address to maximize the advantages that come from this technology. Hence, the aim of this study is to examine the metaverse implementation within the education sector through a thematic analysis of existing literature in Information Systems to identify the key themes related to benefits, challenges, and value the Metaverse offers to its stakeholders. But first, we discuss related work on the Metaverse in the next section.

II. RELATED WORK

The Metaverse is a concept that started in fiction movies but that has now become a reality and a growing trend in the last few years. Despite the popularity of the term "Metaverse", there is not a unified concept of what it means, resulting in various interpretations by internet giants [Wang and Medvegy, 2022]. Some of the big companies (e.g., Meta and Microsoft) are making changes to become the market leaders in this area [Peukert et al., 2022]. Meta has transformed its entire company image into a Metaverse oriented business, while Microsoft has acquired Activision to incorporate the latter's interactive imaging technologies into its vision of the next generation internet. However, the term has come to be used as an encompassing term for all the various multi-user virtual environments that currently exist [Lu et al., 2022]. One of the ways to understand Metaverse is to examine its benefits, challenges, and value to its stakeholders.

The Metaverse has the potential to bring significant benefits to education, but at the same time there are numerous challenges for learners, educators, and regulators that need to be addressed during the transition to these platforms [Sultanow et al., 2022; Lu, 2022; Wang and Medvegy, 2022; Narin, 2021]. Through digital campuses, Metaverse can provide learners with a holistic campus experience in addition to virtual training and simulation [Sultanow et al., 2022]. According to Wang and Medvegy [2022], one of the key potential applications of the Metaverse is education and training. A content analysis of the articles published in Metaverse discusses how Metaverse can be used to design a learning process, and its application in engineering, mathematics, and sports [Narin, 2021]. Furthermore, the government can further support learning in remote areas through the virtual reality technology theme of the Metaverse [Lu et al., 2022].

Several researchers have identified the benefits that the government can gain from implementing the Metaverse. Some of these benefits include education and training by simulating different learning scenarios that can help prepare students or new employees [Lu et al., 2022]. Another benefit is healthcare accessibility by providing healthcare services remotely with Augmented Reality (AR) [Mystakidis, 2022]. Additionally, social connection by creating virtual scenarios where users can interact and form social bonds without leaving their homes [Sultanow et al., 2022]; and urban planning, which can benefit greatly from the Metaverse by creating simulated scenarios for smart constructions and city development [Wang and Medvegy, 2022].

Metaverse offers numerous benefits, but many challenges must first be overcome, especially if the government wants to get involved with these platforms. The most common challenges identified by

researchers include privacy and security of the user, as there is a significant increase in the amount of data exposure when accessing these platforms [Lu et al., 2022]. Addiction is also a big concern, as many users may spend more time in the virtual world, avoiding their responsibilities in the real world [Schobel and Tingelhoff, 2023]. Disinformation may also increase tremendously, as many individuals will generate content without having reliable sources, leading to false information for those immersed in the Metaverse [Peukert et al., 2022]. Furthermore, the digital divide may increase. Not all people will be able to afford the expected increase in the price of the technology. This can exclude people from low socio-economic background from new opportunities that the Metaverse can provide [Mystakidis, 2022].

We review some of the ideas to address those key challenges (addiction, privacy and security issues, digital divide, and disinformation) [Bao and Shou, 2022, Lu et al., 2022]. According to Better Health Channel (2023) [Digital Strategy and Services Unit in the Victorian Government's Department of Health], one of the best treatments for addiction is based on cognitive behavioral therapy, which involves changing patterns of thinking and beliefs. Virtual reality-based applications have been found to be useful in cognitive behavioral therapy [Wu et al., 2021]. Furthermore, the virtual reality (VR) device that users use to enter the Metaverse can provide feedback on how much time they have been online and suggest taking breaks. This could help the users realize the amount of time they have spent in the virtual world. Moving on to the issue of disinformation, this is one of the most challenging problems to tackle as fake news are constantly being generated and influencing people [Bao, 2022]. However, if the government finds a way to regulate the information generated and distributed, the Metaverse can become a ubiquitous channel to inform users and keep them updated.

Digital divide in the Metaverse ecosystem can arise due to the high price of VR headsets, limited internet access, and other factors. As mentioned by Lu et al. [2022] governments in Australia have started working to ensure connectivity in all areas of the country. However, they will need to continue their efforts to make VR technology accessible to everyone, so that all users can enjoy the benefits that the Metaverse can offer and mitigate digital vision in communities. Lastly, privacy and security issues should be addressed to prevent users from overexposing their personal information. If the government handles this correctly by implementing Metaverse safeguards, then Metaverse can become a safe space for people of all ages and backgrounds. The opportunities and challenges of the Metaverse discussed in this section indicate that it is an emerging technology that has the potential to impact many areas of our society. The stakeholders will adopt new technologies based on the perception of value and hence in the next section we discuss value generated by the Metaverse.

The first step to create value with this technology is identifying all existing challenges that are obstructing the materialization of Metaverse opportunities [Schöbel and Tingelhoff, 2023]. Additionally, it helps individuals and organizations to make informed decisions on how to take advantage of its potential benefits and mitigate potential risks. According to Schöbel and Tingelhoff [2023], to bring the Metaverse to life and create value, users need to perceive them as useful. Value can be determined by individuals by their perception of how useful are, the inputs and outputs generated by the Metaverse ecosystem. Sweeney and Soutar [2001] classify value in three dimensions: emotional, functional, and social. Emotional value describes feelings and individual experiences (e.g., enjoyment), social value describes individuals' self-concept (e.g., building relationships) and functional value describes performance and quality (e.g., completing a task). Once the benefits and challenges are identified, we will use the value framework to discuss emotional, functional, and social value to stakeholders in the Metaverse ecosystem.

In conclusion, there are many benefits and challenges for users of the Metaverse, but to have a smooth transition there are many challenges to overcome to make sure no one is left behind. Currently, many governments, including the New South Wales Government in Australia [Lu et al., 2022], are analyzing ways to bring the Metaverse to education, medicine, construction, economics, and many other fields. There have been numerous studies conducted on Metaverses; however, none of them comprehensively consolidate the value to stakeholders in an education context. There are many ways of evaluating value to stakeholders; however, based on the findings made by Lu et al. [2022] while studying different Metaverse applications and Schöbel and Tingelhoff [2023] by

interviewing metaverse experts, using qualitative research is the best approach for answering the following research question. Hence the research question that this study aims to address is:

- (1) What are the overarching themes of Metaverse in Education from an Information Systems perspective?

To address the above research question, we use a thematic analysis [Maguire and Delahunt, 2017] of existing literature in Information Systems to identify the key themes related to Metaverse in an education context. We adopt the Dynamic Capability Theory [Teece, 2018] as a theoretical framework for this study based on its capability to embrace internal and external competencies in response to a rapidly changing environment. The Dynamic Capability Theory and research method are discussed next.

III. DYNAMIC CAPABILITY THEORY

The dynamic capability theory is a theoretical perspective in the study of strategic management that has gained popularity in Information Technology due to its high relevance in contemporary business [Mikalef et al., 2021]. According to Teece [2018], the framework explains how firms can adapt to a changing environment and sustain competitive advantage over time. It suggests that a firm's ability to build, integrate, and reconfigure internal and external resources is critical for its success. Dynamic capabilities of an organization include sensing (harnessing outside opportunities), seizing (generating value from those opportunities) and transforming (continuous improvement). The Metaverse will revolutionize many industries and companies including education that quickly adapt to the new business models it offers [Lacity et al., 2023; Teece, 2018]. Schools and universities need to learn how students can gain better experiences and acquire more knowledge through the opportunities that the Metaverse will present. Digital Capability Theory is suitable for this study since the benefits, challenges and values offered by Metaverse could indeed be examined in terms of *harnessing, seizing, and continuous improvement*. In the next section, we discuss the research method.

IV. RESEARCH METHOD

Qualitative research is a suitable approach to understand concepts and generate thorough insights about a phenomenon that is not fully understood [Neuman, 2014]. After careful consideration of the various types of analysis and methodologies, it was determined that a qualitative research approach would be the most suitable for this project since the aim of this study is to identify overarching themes in Metaverse found in an education context from an Information Systems perspective. Among the various methods available, thematic analysis was selected to collect and process the data, following the six-step process outlined by Maguire and Delahunt [2017]. The steps to collect, analyze and generate themes are discussed next.

Data collection: To gather relevant literature on the Metaverse, we conducted searches for the term 'Metaverse' in the Association for Information Systems (AIS) eLibrary and identified articles published within the last three years. We limited the search to three years since Metaverse is a relatively new technology and has gained significant attention from academics in recent years. Our primary data collection was from the AIS eLibrary (April-May 2023) followed by the Journal of MIS, Decision Support Systems, European Journal of Information Systems, Information and Management, Information and Organization, Information Systems Journal, Information Systems Research, Journal of Information Technology, Journal of Strategic Information Systems, and MIS Quarterly (September-November 2023).

All the information for this study was gathered from secondary data and hence there was no direct interaction with individuals or institutions for data collection. We employed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method, which yielded 193 articles in our initial search for the term 'Metaverse.' After reviewing the titles, abstracts, and keywords, for the term "Metaverse", we determined that only 37 of these articles were relevant to our research. However, when we narrowed our focus to the last 3 years, we found that only 33 articles were suitable for inclusion in this study. After a thorough examination of each

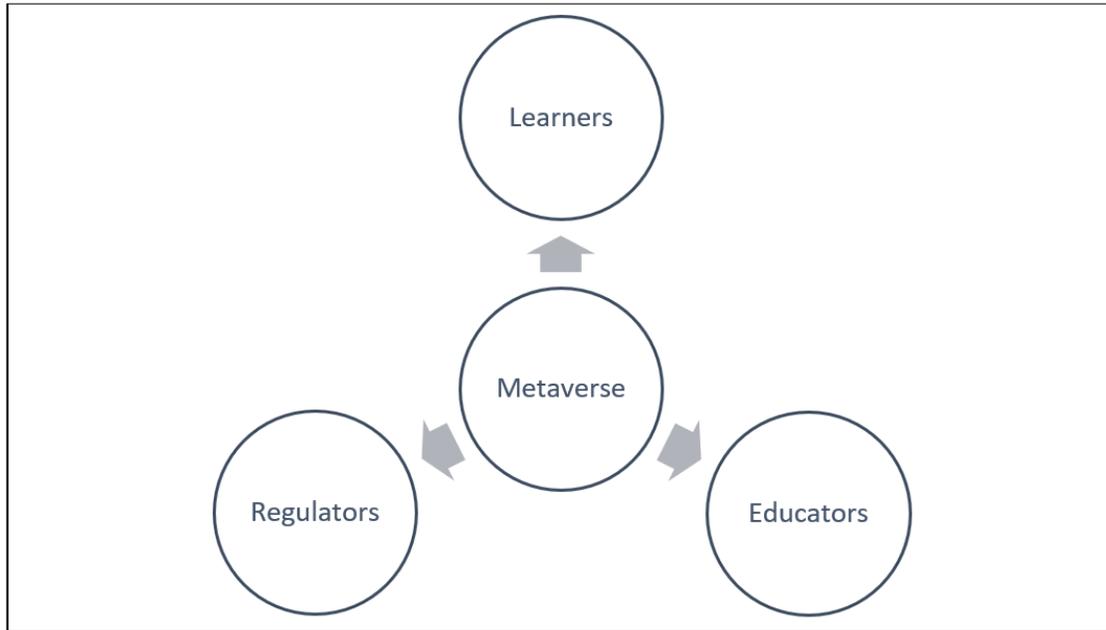


Figure 2: The Metaverse Ecosystem in Education

article content with respect to the definition and discussion of the Metaverse, we identified 22 articles as relevant from an Information Systems perspective. In addition, relevant articles cited in these 22 articles were carefully examined which resulted in the adoption of the Value framework in this study. In addition, a recent industry-based publication from the NSW government [Lu et al., 2022] was also considered to assess the future impact of Metaverse. The PRISMA method is illustrated below in Figure 1 and the data analysis steps are discussed next.

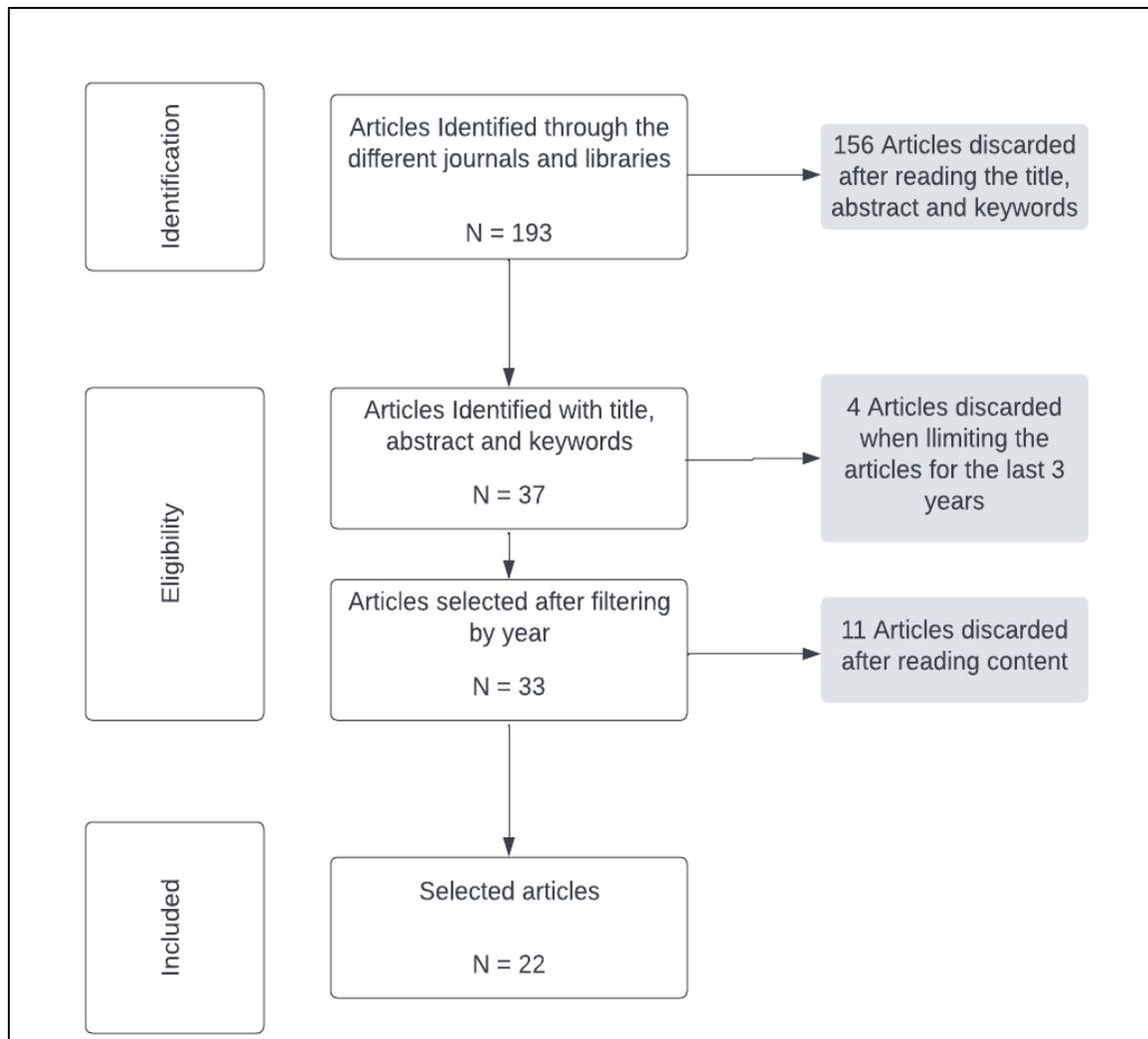


Figure 1: Selection of articles using PRISMA

Data analysis: We followed the six-steps process of Thematic Analysis outlined by Maguire and Delahunt [2017], which consist of:

Step 1: Become familiar with the data – In this step researchers read and re-read the data to gain a general understanding of the data. Researchers took notes, highlighted important sections, and noted down initial thoughts. A shared google drive was used to store the selected articles mentioned in the previous section. Access was provided to both researchers and a summary of the relevant articles were prepared.

Step 2: Generate initial codes - In this step, researchers began examining the articles based on benefits and challenges of the Metaverse in education.

Step 3: Search for themes - Researchers searched for connections between codes to identify potential themes which are overarching ideas that emerge from the data. The main theme found was “*Metaverse dimension in education*”.

Step 4: Review themes - Researchers reviewed and refined the identified theme. This was substantiated by asking if the main theme was relevant to the research question and if enough evidence was found to support it.

Step 5: Define themes - Once researchers finalized the main theme, they discussed subthemes with respect to the dimension of Metaverse in education. This involved creating a clear and concise description of each subtheme. Thus, the main theme i.e., *Metaverse dimension in education* was supported by the sub themes i.e., *Metaverse for educators, Metaverse for learners and Metaverse for regulators*.

Step 6: Write-up - This involved writing up the analysis in a clear and concise manner. In the next section we discuss the results of thematic analysis.

V. RESULTS

Our examination of data revealed key insights into the potential advantages and hurdles associated with the Metaverse implementation in education. Main benefits in the education sector are its potential in simulating diverse learning scenarios. This can enhance education and training by providing immersive, experience-based learning opportunities for students and employees. The Metaverse can thus be used to prepare individuals for real-world situations in a safe and controlled environment, leading to effective learning. Thus, Metaverse plays a significant role for educators and learners. Due to significant large data collected, the main challenges the Metaverse has are the privacy and security concerns. Users are exposed to potential data breaches and privacy violations when accessing these platforms. Safeguarding user's data and ensuring secure interactions within the Metaverse will be essential for its successful integration in education. Additionally, accessibility to the Metaverse remains a concern, as not everyone can afford the necessary technology. This can lead to inequalities. Governments and regulators in the education ecosystem must work together to close this gap, ensuring that all students have access to opportunities presented by the Metaverse. Educators and regulators play a huge role in mitigating the challenges ensuring students can have a safe and ideal environment to enhance their learning process. Thus, regulators play a significant role in the implementation of Metaverse. In conclusion, the main theme – Metaverse dimension in education is supported by three subthemes which are Metaverse for educators, Metaverse for learners and Metaverse for regulators. The Metaverse ecosystem in education is illustrated below in Figure 2 and discussed in the next section.

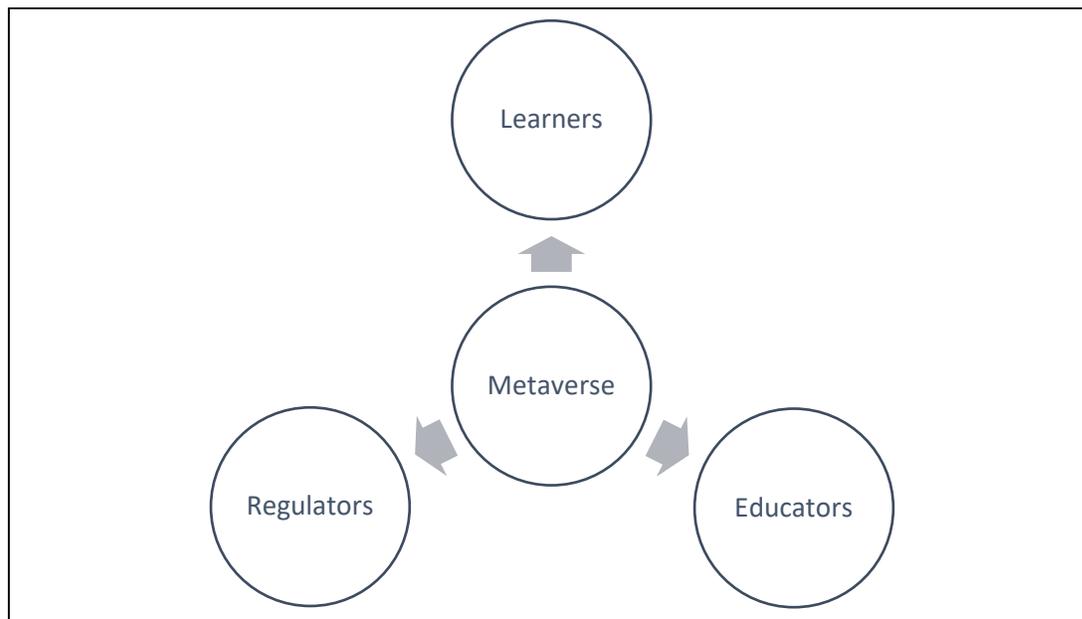


Figure 2: The Metaverse Ecosystem in Education

Metaverse for educators: Triantoro and Jackson [2022] state that educators will need to adapt to the new digital environment and develop new competences to provide adequate training for students. Strategies to upskill and reskill includes, branching scenario training, and role play serious games, which require educators to develop new skills and competencies to design and deliver effective training. Contreras et al. [2022] emphasizes that the Metaverse will allow for the personalization of content for each student, making it easier for teachers to monitor and evaluate their progress. It will also allow the integration of virtual environments in which students and teachers can interact as they would in a face-to-face classroom. The main concern is the loss of contact between the student and the teacher, as well as the potential negative effects on culture and relationships in the real world [Contreras et al., 2022]. Additionally, educators must find a way to regulate behaviors inside the Metaverse to prevent harassment and inappropriate attitudes between learners [Schöbel and Tingelhoff,2023].

Rinn et al. [2023] emphasizes the importance of course design which must consider the unique features of the virtual world when courses are offered through this technology. Simultaneously, educators must facilitate learner interaction, as the absence of real-world interaction can be a potential drawback of implementing this technology in the education sector. Furthermore, Gleich et al. [2023] stress the need for technological literacy among stakeholders in the institutions using the Metaverse. Furthermore, understanding the best way to introduce students to this technology is crucial to prevent learner frustration and enhance content engagement which could lead to a significant improvement in the quality of education and better outcomes for learners.

Metaverse for learners: Rinn et al. [2023], discusses potential application areas of the Metaverse in education, including activities, events, and interaction which could enhance learners' experiences. Additionally, the immersive and interactive nature of the Metaverse could provide the students with new opportunities to engage with the content and collaborate with their peers through a virtual environment. On the other hand, Triantoro and Jackson [2022] state that these virtual experiences provide learners with opportunities to learn through exploration and decision making in real-time on simulated environments that can enhance their learning experience. Furthermore, the Metaverse offers learners great control over their learning tasks by allowing them to access information from any location and personalize their learning experience. The Metaverse has the potential to transform the traditional learning experience and provide learners with opportunities to develop new competencies and skills (e.g., decision-making in an unfamiliar situation).

Stylianou and Savva [2022] highlight the potential consequences this transformation could have on younger generations, raising concerns about addiction and social isolation. School plays a vital role in creating friendships and developing social skills for children. However, a shift from face-to-face interactions to a virtual environment may prevent the development of these crucial social skills, leading to isolation and adverse outcomes, when these learners face real-world situations. Furthermore, Gumbo et al. [2023] emphasize that virtual worlds introduce the possibility of increased negative social experiences, including harassment. It is essential to educate and make learners aware of these potential experiences to prevent a significant rise in such incidents with the adoption of the Metaverse.

Metaverse for regulators: The use of the Metaverse in education presents several governance challenges. Contreras et al., [2022] states that the great technological advances required for the Metaverse may not be within everyone's accessibility and not always available to all education institutions, leading to unequal access of educational opportunities to users from diverse background. Additionally, regulators need to ensure the safety and security of students in the Metaverse, as they may be exposed to cyberthreats such as cyberbullying and harassment. Furthermore, the use of these technologies in education may require the development of new policies and regulations to ensure its safety and ethical use, such as protecting learners' data and privacy. To ensure the proper adoption of Metaverse, regulators must prepare educators with special training and resources that could mitigate the negative impact of this new technology [Contreras et al.,2022]. Additionally, Lin et al., [2022], mentioned that the governance challenges using the Metaverse include the need for community standards of conduct, which could prevent moral problems such as bullying, and insulting each other. Furthermore, due to the larger size of

the Metaverse ecosystem, administration costs after adoption will significantly rise when compared to the traditional education system.

Hunt and Angelopoulos [2023] have pointed out several challenges in the Metaverse, particularly in terms of interoperability, and scalability. Currently, the Metaverse is fragmented, with various platforms and technologies that are not compatible with each other. From a technical perspective, scalability poses a significant issue since the Metaverse is expected to experience rapid growth in the coming years. This growth could present challenges to the underlying infrastructure, including concerns related to bandwidth, storage, and processing power. Additionally, there are security, privacy, legal, and ethical concerns that regulators must address to ensure the safe use of this technology by users.

VI. DISCUSSION OF FINDINGS

The findings in the previous section suggest that the Metaverse has the potential to transform the traditional learning experience and to offer learners new opportunities to develop competencies and skills. The immersive nature of the Metaverse can enable students to engage with education content and collaborate with peers, providing social value through a virtual environment. Additionally, learners can gain greater control over the learning materials, which translates into functional value, and into experience innovative learning opportunities that translate to emotional value, allowing learners to personalize their information access. The Metaverse can thus be used by stakeholders in the education ecosystem to create value and improve the field of education.

It is evident that many challenges arise when using the Metaverse, and we cannot disregard the scope for unintended consequences, which may have serious implications to our society. Triantoro [2022] and Nickerson et al., [2022] have pointed out that the lack of accessibility due to high technology costs can significantly widen socio-economic disparities, resulting in unequal access to Metaverse-based education. These consequences are not limited to younger generations and can affect learners from diverse backgrounds. Additionally, Augenstein and Morschheuser [2022] have noted that while the Metaverse can enhance education in some cases, the level of immersion may vary depending on circumstances. In some context, it may not be as immersive as the real world, particularly during learning activities like driving or those involving physical safety as a concern. To enhance immersion, substantial investments in network infrastructures, software, and hardware are necessary to create the 3D environments required for an improved Metaverse experience in education [Marabelli and Newel, 2023].

From a theoretical standpoint, the Metaverse aligns with the sensing (harnessing opportunities) and seizing (generating value from those opportunities) dimensions of Dynamic Capability Theory. However, given the evolving nature of the technology, this study did not find evidence of its transforming dimension (i.e., continuous improvement). Nevertheless, from a value perspective, the Metaverse undeniably provides social, functional, and emotional value in education. The value dimensions are discussed below.

Functional value: The five functional values evident in the analysis are listed as follows:

1. **Personalization of learning:** Educators can create personalized learning experiences tailored to student needs. Learning materials and scenarios can be adapted to different learning styles, allowing students to learn at their own pace.
2. **Data driven insights:** Metaverse can provide educators with insights into student's performance and behavior. By analyzing user interactions within the virtual environments, educators can identify the areas where the students struggle, allowing them to develop strategies to improve the learning process.
3. **Educators' professional growth:** Educators can use the Metaverse to enhance their own development, collaborating with peers, attending virtual conferences, and experimenting with new teaching methods that will contribute to developing their teaching skills.
4. **Innovative assessments:** Traditional assessments can be replaced with innovative evaluation methods in the Metaverse. For example, performance assessment in diverse scenarios can offer a more accurate and authentic evaluation of students' abilities.

5. **Cost efficiency:** The Metaverse reduces costs associated with physical infrastructure and materials. Instead, educational institutions can invest in virtual resources, which are more affordable for both, educators, and students.

Social value: The two social values evident in the analysis are as follows:

1. **Immersive learning environments:** The Metaverse provides a platform for the development of immersive learning environments. Through Virtual and Augmented reality technologies, students can “step” into virtual classrooms, historical events, or even scientific experiments. This enhances engagement and understanding, making complex topics more understandable.
2. **Global collaboration:** Classrooms can be borderless, enabling students from around the world to collaborate on different projects while sharing cultural insights, and gain global perspectives. This enhances cultural awareness and prepare students for the globalized workforce.

Emotional Value: Emotional value is a key aspect of Metaverse technology. As noted by Marx et al. [2022], one of the remarkable opportunities offered by the Metaverse is location independence. This means that the Metaverse enhances accessibility to education, especially for individuals with disabilities or geographical limitations.

1. **Accessible to education:** Students unable to attend traditional educational institutions due to health conditions or geographic isolation can access quality education, reducing inequalities in modern societies. They could participate online and share their experiences, gain emotional support from peers which could lead to a sense of accomplishment.

The three aspects of value creation are illustrated below in Figure 3.

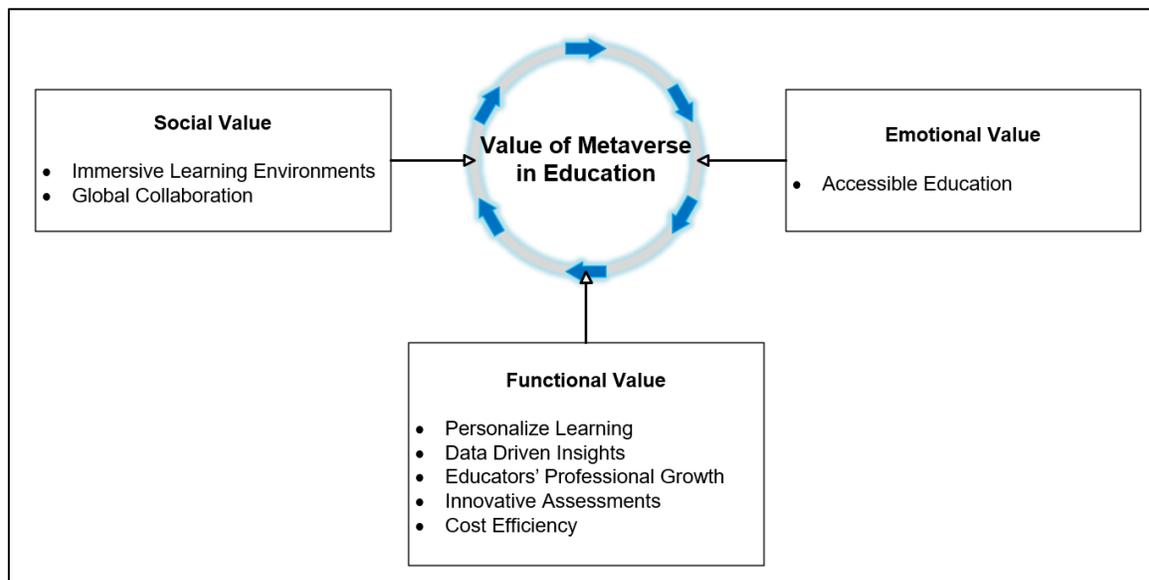


Figure 3: Value Creation

In general, this study identifies the overarching themes of Metaverse found in education from an Information Systems perspective. We also found evidence of the sensing and seizing dimensions of the Dynamic Capability Theory and the social, functional, and emotional dimensions of the Value framework. The practical implications of this study are:

First, to harness the full potential of the Metaverse and to mitigate its challenges, it is important to invest in educators’ training to make a smooth transition and ensure a high-quality education.

Second, addressing governance and safety concerns, promoting digital inclusion, and developing regulations and policies are the fundamentals steps that government needs to take for a successful adoption of the Metaverse in education.

Third, improving teacher-student interaction, content personalization, and community engagement should be a priority in the Metaverse implementation strategy.

Fourth, continuous monitoring and evaluation will enable adjustments for optimal outcomes, ensuring that the Metaverse enriches the educational experience and prepares the workforce for the future.

VII. CONCLUSION

In conclusion, the main theme – Metaverse dimension in education is supported by three subthemes which are Metaverse for educators, Metaverse for learners and Metaverse for regulators. The Dynamic Capability Theory and Value framework were used to understand the theoretical aspects of this study. From a theoretical standpoint, the Metaverse aligns with the sensing and seizing dimensions of Dynamic Capability Theory. However, given the evolving nature of the technology, this study did not find evidence of its transforming dimension. From a value perspective, the Metaverse undeniably provides social, functional, and emotional value in education.

The exploration of the Metaverse implementation in the education field shows both, its big potential and the significant challenges ahead that must be addressed. This technological evolution offers immersive and personalized learning experiences, global collaboration, accessibility, data driven insights, innovative assessments, and cost efficiency. On the other hand, it also brings significant challenges to governance, privacy, addiction, disinformation, and accessibility. As the Metaverse continues to develop, its successful integration will require a collaborative effort of educators, learners, and regulators, ensuring that the benefits this brings are widely accessible for everyone. In the future, this study will be extended to gather insights from educators (e.g., academics in tertiary institutions), regulators (e.g., Tertiary Education Quality and Standards Agency) and learners (e.g., students in tertiary institutions) through a semi-structured qualitative interview to understand the value generated for stakeholders in tertiary institutions.

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