Drivers of metaverse adoption among children and youths: a UTATU2 perspective

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Abstract

Introduction. Despite increasing commercial and research interest in the metaverse, its adoption has been limited due to challenges such as technological complexities, usability issues, cost, and privacy concerns. This study investigates factors influencing metaverse adoption from the perspectives of children and youths in Asian countries.

Method. Using the *unified theory of acceptance and use of technology 2* (UTAUT2), we conducted semi-structured interviews with 40 individuals aged 13 to 24 to understand their metaverse usage habits and the perceived drivers of adoption.

Analysis. Audio recordings of all interviews were transcribed. The transcripts were manually content analysed through an iterative process. Themes were based on the UTAUT2.

Results. Entertainment, socialization, and education were primary activities conducted within the metaverse. Adoption was mainly driven by performance expectancy, facilitating conditions, and social factors.

Introduction

The term *'metaverse'* has gained significant attention in recent years. For instance, the governments of South Korea and Dubai have invested millions in developing metaverse ecosystems (Piscione & Drean, 2023). Scholars also predict that the metaverse trend will continue to grow (Sami et al., 2024). However, user adoption has not progressed as quickly as expected. Metaverse adoption in educational settings, for example, remains low (Talan & Kalinkara, 2022), largely due to challenges related to technology, usability, cost, and privacy concerns (Al-Kfairy et al., 2024; Iwanaga et al., 2023).

As a result, there has been a growing body of research focused on understanding the drivers of metaverse adoption. Drivers are factors that encourage, facilitate, or support individuals in their adoption of technologies (Makransky & Mayer, 2022). Examples include perceived enjoyment and satisfaction (Makransky & Mayer, 2022), as well as user expectations of performance (Lee, Trimi, & Kim, 2013). Such research is crucial because it offers strategies to enhance the adoption of potentially transformative technologies and provides valuable insights into ensuring their sustained usage.

There are three research gaps in extant work on the drivers of metaverse adoption. First, existing studies predominantly focused on general users or university students (Alawadhi et al, 2023; Almarzouqi et al, 2022) with limited exploration of younger age groups. To date, only a few empirical studies specifically addressed adolescents' perceptions of the metaverse: two studies examined the effectiveness of metaverse applications in educational settings (Makransky & Mayer, 2022; George Reyes, 2020), one proposed a prototype for a metaverse-based physical fitness service for youth (Lee et al，2023), another investigated why teenagers remained engaged in social virtual reality (Maloney et al, 2021), and the final one reviewed the benefits and potential concerns among adolescents (Kim & Kim, 2023).

Second, most empirical research has been conducted in Europe (Makransky & Mayer, 2022), North America (George Reyes, 2020; Maloney et al, 2021), and Gulf-region countries (Alawadhi et al., 2023; Almarzouqi et al, 2022), with minimal representation from the Asian region. Given that cultural differences influence technology adoption (Sewandono et al., 2023), studying metaverse adoption in Asia could significantly enrich the existing literature. Notably, only one study was Asian-focused, examining metaverse acceptance among Korean university students (Lee & Kim, 2022). Third, existing research on children's and youths' adoption of the metaverse has been largely confined to educational settings, with few studies investigating usage outside of this context.

To address these gaps, the present study addresses two research questions: (1) what activities do children and youths engage in the metaverse? (2) what factors drive their adoption? To answer these questions, we employ the *unified theory of acceptance and use of technology 2* (UTAUT2) as our theoretical framework (Venkatesh, Thong, & Xu, 2012). The UTAUT2 extends the original *UTAUT* model by incorporating three new factors - hedonic motivation, price value, and habit - thus enhancing its applicability to both organizational and non-organizational settings (Venkatesh, Thong & Xu, 2012; Blok et al., 2020).

Literature review

Metaverse concepts

The metaverse is an immersive, 3D virtual world where users, represented by avatars, interact with online media, applications, and each other in real-time, creating a personal sense of presence (Abbate et al., 2022). This concept is characterized by three key features: immersion, interaction, and presence. As the anticipated next iteration in the evolution of the internet (Arpaci et al., 2022), metaverse applications have been employed across various industries, including healthcare, education, and engineering (Ning et al., 2023).

Existing research on metaverse usage among children and youths has primarily concentrated on psychological and physiological issues. Studies have examined both the benefits and risks, such as a prototype of metaverse-based training system for youth physical fitness management (Lee et al, 2023), concerns about harassment and privacy (Maloney et al, 2021), and issues related to metaverse addiction, antisocial behavior like cyberbullying, and identity confusion (Kim & Kim, 2023). In contrast, the present study shifts the focus to uncovering the activities children and youths engage in with the metaverse, as well as the factors driving their adoption. Our findings provide a foundation for a better understanding of how these age groups can more effectively engage with the metaverse.

Unified theory of acceptance and use of technology 2

The UTAUT2 is one of the most widely used frameworks for studying technology adoption. Building on the original UTAUT, which included factors such as performance expectancy, effort expectancy, social influence, and facilitating conditions, the UTAUT2 introduces three additional factors: hedonic motivation, price value, and habit (Venkatesh, Thong, & Xu, 2012). The UTAUT2 was selected because of its consistency and robustness in explaining usage intention and actual use of new technology when compared to other frameworks (Blok et al., 2020; Abbate et al., 2022).

The UTAUT2 has been applied across various technology contexts, including smartwatches (Beh et al., 2021), smart homes (Nascimento et al., 2023), and blockchain-based remittance services (Mansoor et al., 2023). In the context of metaverse-related applications, it has been used to study adoption within the education sector. For instance, Sunardi et al. (2022) investigated students' adoption of augmented reality in a video conference learning course during the COVID-19 pandemic, while Teng et al. (2023) examined the adoption of mixed reality systems by students enrolled in medical courses.

Methodology

Qualitative interviews were conducted with 20 children between 13 and 17 years old (represented by 'C' and a unique number in subsequent sections), and 20 youths between 18 and 24 years old (represented by 'Y' and a unique number) to understand their metaverse usage habits and perceived drivers of metaverse adoption. The interview method was chosen because it allows for an in-depth examination of participants' experiences, considerations, and interpretations, thereby enhancing our understanding of metaverse use and perceptions (Lee, Kang, & Kim, 2023). Participants were recruited from the Asia-Pacific region including Singapore, India, and China.

Participants consisted of 19 females and 21 males, with 38 still in school, ranging from secondary school to university levels, and two who had just entered the workforce. Parental consent was obtained for participants under 21 years old, while those 21 and above provided their own consent. Recruitment was carried out using snowball sampling, starting with the researchers' network, and expanding through voluntary referrals from participants at the end of each interview.

All interviews were conducted online via Zoom, each lasting approximately 45 minutes. The audio recordings were initially transcribed using Zoom's caption function and then manually corrected by a researcher. The transcripts were analyzed through an iterative process to ensure internal consistency. A researcher and a trained student assistant jointly coded four transcripts (10% of the total) based on themes related to UTUAT2. During this process, disagreements were highlighted, discussed, and resolved. Subsequently, the remainder of the transcripts were equally divided between the two coders for analysis. The intercoder reliability achieved a 93% agreement. This approach aligns with existing content analysis practices (Stemler, 2000).

Conclusions

Metaverse usage patterns

Interestingly, games served as the primary gateway to the metaverse for many participants. Specifically, 28 of our 40 participants reported engaging with metaverse platforms primarily through free-to-play, open-world, action role-playing game platforms. The most frequently mentioned games were Roblox, Minecraft, Genshin impact, and Mobile legends. Participants typically played on mobile devices or desktop computers. Notably, only one participant reported using VR headsets to play tennis for skills and rules practice. Participants generally used metaverse platforms weekly, spending 2-3 hours per session.

Unsurprisingly, entertainment was the most common reported reason for using the metaverse. This category included two aspects: playing role-playing games with friends, such as killing creatures, collecting items, or completing missions, as well as creating new experiences. For instance, participant C3 (male, 13 years old) noted, '*metaverse games are very realistic, and it's fun - you can play with your friends, or you can play with anyone on the internet.*' Additionally, two participants mentioned creating their own games on Roblox: C12 (male, 14 years old) built a house in Roblox and invited his friends to decorate it, while C4 (male, 13 years old) developed a game for physics simulation.

Socializing was the second most reported reason for metaverse use, encompassing interactions with friends, family, or even strangers. Games often facilitated these social connections, as noted by C15 (female, 16 years old), who played metaverse games to engage with friends who enjoyed gaming. Chat functionality was also a popular method for socializing, with nine participants reporting chatting with random people online. Education was the third most common but reported by only four participants who used the metaverse as part of school or training requirements. Finally, two participants explored virtual environments with no fixed aim to pass the time.

Metaverse drivers

Within the UTAUT2 framework of metaverse adoption (Blok et al., 2020), the primary factors identified from the interviews were performance expectancy, social relations and social influence, and facilitating conditions. In contrast, effort expectancy, perceived value, and habit were less frequently mentioned.

Performance expectancy

Performance expectancy refers to the extent to which users believe that using technology will help to improve job performance goals (Lee et al, 2013). Put simply, it refers to the usefulness of a technology. Participants highlighted three main themes under performance expectancy as drivers for metaverse adoption. First, the metaverse was reported as a means of stress relief. This was the most frequently mentioned reason for using metaverse platforms, with participants indicating that the metaverse offered a valuable break or a nice distraction from work or school. As one participant put it succinctly, playing games in the metaverse is '*just like a form of relieving stress*' (Y11, female, 20 years old).

The second-most common theme was the metaverse's role as a tool for building and maintaining relationships. Participants utilized the metaverse to connect with friends, family, or unknown people globally. It was described as '*a little bonding session with my friends*' (Y13, male, 20 years old) and as '*an icebreaker or a warm-up activity for classmates to get to know each other*' (Y4, female, 20 years old). Lastly, the metaverse was acknowledged as offering new ways to gain knowledge. For instance, C13 (male, 13 years old) noted that a game could simulate real-world scenarios like managing finance, where users must budget and control their spending.

Social relations and social influence

Social relations refer to the relationships or interactions between individuals, while social influence refers to the way individuals are affected by those, they spend time with (Montgomery et al., 2020). Participants' close relationships with their friends, family members, and peers played a significant role in their adoption of the metaverse. Many participants reported being introduced to the metaverse by friends or family. For example, Y7, a 20-year-old male, began exploring the metaverse via World of Warcraft due to his friends' interest in such platforms. To join them, he also started playing similar games, a trend echoed by four other children and two youths.

Facilitating conditions

Facilitating conditions involve users' perceptions of the availability of the resources and support necessary for engaging with technology (Venkatesh et al, 2012). In this study, this concept encompasses the personnel and educational resources available to assist with metaverse use. Personnel includes teachers, coaches, and support staff who aid in using metaverse hardware and software, while educational resources consist of demonstrations, tutorials, and other material to assist users. Given the unique and novel nature of virtual reality experiences offered by metaverse platforms (Montgomery et al., 2020), users often require support, particularly during the initial periods. For instance, Y3 (male, 24 years old) received training on using a VR headset and remote controller and reported that coaches and support personnel were present to guide him and address equipment issues.

Other drivers

Three categories of drivers were less represented in the participants' responses: effort expectancy, perceived value, and habit. First, effort expectancy refers to the ease of using the technology (Venkatesh et al, 2012). For instance, Y10 (male, 20 years old) used Roblox and emphasized that the barriers to entry were *'not too high'*.

Next, perceived value involves the cognitive trade-offs between the benefits of the technology and its monetary cost (Venkatesh et al, 2012). Y11 (female, 20 years old), for example, spent money on avatar skins and decorations in Roblox, which he deemed *'valuable'*, leading him to continue using and *'safeguarding'* them. Finally, habit is defined as the extent to which individuals automatically engage in certain behaviors (Venkatesh et al, 2012). Two participants reported that their enjoyment of metaverse games led to the formation of a habit of trying out new games, such as Villain, League of legends, and Mobile legends.

Discussion and conclusion

This study investigated the types of activities children and youths performed on metaverse platforms and the factors driving their adoption. Our findings revealed that the most frequently cited activities were entertainment, followed by socialization, education, and exploration. Using the UTAUT2 framework, we identified three major drivers for metaverse adoption: performance expectancy, social relations and social influence, and facilitating conditions. Effort expectancy, perceived value, and habit were mentioned less frequently by participants.

Given the dominance of gaming in metaverse usage, it was unsurprising that hedonic goals, namely, entertainment, socializing, and exploration were frequently cited reasons for engagement. Closer examination of participants' responses indicated that these motivations were often interconnected. For instance, in multi-user metaverse games, participants reported playing them for enjoyment and staying in touch with their friends, highlighting the appeal of such games in fulfilling multiple gratifications simultaneously (Yu, 2024).

Consistent with the UTATU2 literature (Abbad, 2021; Sewandono et al., 2023), performance expectancy emerged as the primary driver for metaverse adoption. This may be attributed to the metaverse's role as a technological tool for enhancing well-being and providing a social space for

meeting and making friends. Social influence was also found to be a significant driver of adoption (Okumus et al., 2018), potentially due to younger users being more sensitive to peer influence (Ciranka & Van den Bos, 2019) and experiencing a *'fear of losing out'* when others used the metaverse (Lee, Nguyen, & Yang, 2023). Moreover, in Asian countries where collectivistic cultures are predominant, people tend to rely on other likeminded individuals who have already adopted the innovation for their own decision making (Lee et al, 2013). Next, facilitating conditions, such as personnel and educational resources, were found to support metaverse adoption, aligning with recent studies that emphasized the importance of perceived support and resource accessibility in technology acceptance (Abbad, 2021; Patil et al, 2020).

It was interesting that effort expectancy, perceived value, and habit were the least mentioned drivers among participants. This suggests a lower emphasis on these factors compared to prior research (Yang et al, 2022). One possible explanation is that younger individuals are generally more open to new technology and are technologically savvy (Szymkowiak et al, 2021). To them, their focus is more on using new technology than about usability or value. Additionally, since many participants were school going, they likely did not have sufficient time to form habitual metaverse usage (Bayram, 2022). As well, examining habitual use of the metaverse may be more appropriate and productive during its growth or maturity stage. This is because with more people adopting a mature technology, there will likely be more opportunities to study habit formation and prolonged use (Tamilmani et al, 2019).

This study makes both theoretical and practical contributions. Theoretically, it extends the applicability of the UTAUT2 model to the metaverse context by adapting its factors to suit metaverse-specific use cases. It also enriches the metaverse adoption literature by including perspectives from children and youths in the Asia-Pacific region. Practically, the study suggests that metaverse companies focus on performance expectancy when developing platform functionality. Additionally, it recommends providing increased support personnel and training resources during the initial deployment of metaverse applications. This could be achieved through partnerships and collaborations between metaverse companies and educational institutions, for example, building an education-oriented metaverse ecosystem where teaching and learning occur virtually with interactive and shared open resources (Zhai et al., 2023). However, this study has limitations. The sample size was small, and the results may not be generalizable. Future research could address this issue by recruiting larger samples of participants and conducting quantitative surveys to validate the findings. Furthermore, as the study was conducted at a single point in time, future longitudinal research is needed to examine how perception of drivers evolves as children and youths mature in both age and metaverse experience.

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