

Characterizing Desired Metaverse Experiences: A Comparative Analysis of Korean and American Users

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Abstract

Background The growth of metaverse industries has led to an influx of content in the digital world, but not all of it has been positively received by users. The current metaverse technology creates a contrast between the experience and the user's imagination. Moreover, to create metaverse content that is suitable for different regions and cultures, it is important to understand the interests and desired activities of users. Hence, we sought to identify the characteristics of the experiences desired by users on metaverse platforms.

Methods To do so, we conducted a time series analysis of user interest and employed web-based data crawling and term frequency-inverse document frequency (TF-IDF) to examine activities of interest to Korean and American users. Positive experiences were identified using emotional keywords, and experts compared these experiences in terms of reality, continuity, and social interactivity.

Results The results showed that Korean users were more interested in education- and travel-related content, whereas Americans preferred content related to creative activities, concerts, and live shows. Both groups shared a high interest in economic activities, such as banking and trading NFTs. Regarding reality, Korean users preferred realistic experiences in work and economic activities, whereas Americans favored unique, metaverse-specific experiences across all categories. With regard to continuity, Koreans liked short-term experiences, such as events and forums, except in leisure, while Americans preferred continuous experiences in education and work. In terms of social interactivity, Koreans favored individual experiences in economic and leisure activities for convenience, while Americans desired interactive experiences in the work category.

Conclusions It is expected that the results of this study will serve as fundamental data to analyze the characteristics of the experiences in which metaverse users are interested. Furthermore, they will help to examine the correlation between metaverse experiences. The proposed research agenda can lead to insights into the current metaverse market status and future direction of application in various industries.

Keywords Computational Platform, Metaverse Experience, Text mining, Data-driven Comparative Analysis

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1. Introduction

The reorganization of the industrial ecosystem that provides new experiences by linking with metaverse platforms has increased the scope of the metaverse's market value along with industrial growth (Hollensen & Opresnik, 2023). In addition, the COVID-19 pandemic has further accelerated the use of virtual media throughout existing industries and contributed to IT companies' shift to the metaverse. For members of Gen Z (born between 1996 and 2012), who are familiar with digital media and pursue dynamic and fast-moving trends, the metaverse has become a very suitable medium to experience new activities within the virtual world and its reality.

In particular, the metaverse platform has become an influential environment that allows users to participate in new social and cultural experiences in various countries around the world without time and space constraints (Wang et al., 2022). However, there has been a gap between metaverse content, actual users' desires, and the positive experiences that these users have enjoyed (Lee & Gu, 2022). One study points out that the current metaverse technology is mainly implemented through virtual reality (VR) equipment, which gives the user a fragile sense of presence and creates a huge contrast between the experience and the user's imagination (Zhang et al., 2022). Moreover, due to regional and cultural differences, each user's preferred or desired experiences may vary from country to country and society to society. To create metaverse content that is suitable for different regions and cultures, it is important to understand users' interests and desired activities.

This study aims to examine the characteristics of user experiences (UX) within existing metaverse platforms over the past 5 years. In this context, "experience" refers to the personal insights, abilities, and emotions that a person gains through interactions with the world, while "activity" refers to the actions and pursuits in which a person engages. We defined the activities that interest users, the positive experiences they have had, and the aspects they value, comparing UX in the United States with those in South Korea, two countries that are contributing to the development of metaverse technology and have a large number of users. We adopted a mixed methodology approach including both qualitative and quantitative analyses by addressing the following research questions:

RQ1) What has been the level of interest in metaverse platforms over the past 5 years?

RQ2) What metaverse activities have users been mainly interested in during this period?

RQ3) What are the top 12 most frequently reported positive experiences that users have had while using metaverse platforms?

RQ4) In terms of reality, continuity, and social interactivity, what features characterize users' experiences?

To answer the first question, we collected quarterly data from the web over the last 5 years and analyzed it using time series analysis. For the second question, we utilized web-based data crawling and measured term frequency-inverse document frequency (TF-IDF) to derive activities that mainly interested users in the two countries. To address the third question, we identified instances of positive UX from the IP address-based dataset by filtering emotional keywords. In this case, we mentioned users who live in each region post experience-related

reviews online as ‘Korean user’ and ‘American user’. Finally, for the last question, we conducted a qualitative comparison of features between the two countries, using the Delphi technique, focusing on reality, continuity, and social interactivity. The main contributions of this study are summarized as follows:

1. We investigate similarities and differences in the level of interest in the metaverse and metaverse platforms in South Korea and the US through a trend survey.
2. We derive keywords related to metaverse activities that mainly interest of users in two groups and categorize the activity types.
3. We reveal the rankings of users’ positive experiences to obtain the metaverse industry insight in the preferences of their potential users.
4. By comparing the users’ positive experiences of the two countries, we provide insightful data for those designing user-centered metaverse content.

The remainder of this paper is organized as follows. Section 2 explores different points of view on metaverse experiences through related studies, and Section 3 describes the data collection method and data analysis processes for our comparative study. Section 4 analyzes the research results according to RQ1, 2, 3, and 4. Finally, Section 5 discusses the significance, implications, and limitations of the study.

2. Literature review

Experience is a concept that is widely used in various fields, including education, design, sociology, and management. It stems from certain types of consciousness, like perception and sensation, which give individuals awareness of their presence (Borchert, 2006). In this section, we review the various aspects of the metaverse experience and their classifications suggested in previous research. We also examine existing data-driven studies on the topic.

2. 1. Aspects of metaverse experiences

The metaverse is a medium that delivers immersive digital experiences. The experiences in the metaverse are differentiated from typical augmented reality (AR) and VR applications in that they prioritize sustainable content and social meaning. In that sense, some researchers have proposed social interaction as a crucial aspect of metaverse experiences. The metaverse enables users to socialize through sharing activities, photos, and news links all within virtual environments. It is particularly capable of providing an immersive experience through the exchange of emotions and social interaction in the form of a story, going beyond simply interacting in virtual space (Park & Kim, 2022). Dwivedi et al. (2022) emphasized that collaboration and communication are important attributes of metaverse experiences. On the other hand, Seidel et al. (2022) focused on the integration of the real- and hyper-worlds as a significant aspect of the metaverse experience, where the boundary between the real and unreal worlds is blurred in immersive, interconnected networks. Additionally, they pointed out that these experiences can be composable, meaning they can be potentially tied together in a coherent manner, such as a well-choreographed travel experience or a simulated “how-to” video overlaid on a physical appliance (Seidel et al., 2022). From a reality standpoint,

metaverse experiences can be realistic or unrealistic. Even though these experiences are artificial and hyper-realistic, they are also as immersive and sensory-rich as real-life experiences.

The metaverse is also a medium that encourages user behavioral experiences that affect perception, cognition, and attitudes. Mystakidis (2022) has noted that interactive affordance occurs when users touch, grab, manipulate, and operate virtual objects in an “always-on” virtual world (Mystakidis, 2022). The technological affordance of immersion helps users shape the physicality of the metaverse, whereas the affective affordance leads them to influence the metaverse experiences through empathy and embodiment (Shin, 2022). Based on these fundamental theories, metaverse experiences have evolved within a broader view of affordances. From the perspective of ecological psychology, these experiences enable users to have multisensory and embodied interactions.

In addition, Ash Koosha (2002) emphasized that an optimal metaverse experience specifically requires “continuity”. Interoperable experiences in the metaverse support continuity across the different virtual platforms in which they exist. Users can interact with each other with the assurance of continuity of data related to identity, communications, and transactions with an individual sense of presence, and with a continuity of data (Matthew, 2022). The continuity of use is stressed to facilitate simulated experiences that are both playable and immersive. These experiences are not one-time occurrences but continuous and repeating events that can be carried out today, tomorrow, and the day after. Our review of previous research on metaverse experiences has led us to identify four key aspects, which are presented in Table 1 along with their characteristics.

Table 1 Aspects and characteristics of metaverse experiences

Authors	Aspects	Characteristics
Park and Kim, Dwivedi et al. (2022)	Social interaction	Sustainable, emotion exchange, collaborative, consistent.
Seidel et al. (2021)	Reality	Immersive, surrealistic, coherent hyper-realistic, interconnected.
Mystakidis (2021)	Affordance	Multisensory, immersive, embodied, multimodal, identity construction.
Koosha (2021) Ball (2022)	Continuity	Co-present, interoperable, simultaneous, persistent, synchronous, interconnected.

2. 2. Classification of metaverse experiences

The range of experiences available on metaverse platforms is wide, and it is difficult to place metaverse experiences in one category. However, some scholars have attempted to classify these experiences into different types. Firstly, the metaverse serves to bring new experiences on top of, or in place of, our usual experiences (Paananen et al., 2022). When it comes to reality, the metaverse offers things we have never had before, experiences in the real world that we have not yet undergone, and possible future experiences.

Secondly, experiences in the metaverse are classified from the perspective of the activities.

Jon Radoff, the CEO of Beamable, a live game services platform, and a founder of the medium “Building the Metaverse,” described the immersive experiences of the metaverse mainstream as engagement in activities with others within specific places (Radoff, 2021).

The activities embedded in and linked with emergent content bridge and layer all the elements of the immersive experiences. The activities are not only user driven but also

creator generated: both users and creators experience and create their activities. Even the non-technical user may add content and shape to his or her avatar (Radoff, 2021). We have listed below the representative types of activities based on the 14 categories mentioned by Radoff and elaborated on the specific examples of experiences as shown in Table 2.

Table 2 Experience classification according to “activity”

Activities	Examples of experiences
Games	Making rules, building on game environments, editing music, etc.
Commerce	Purchasing, selling, live commerce, engaging in retail sales, etc.
Collaboration	Meeting, socializing, co-working, communicating, etc.
Travel	Taking flight, sightseeing, visiting heritages, staying in hotel, etc.
Engineering & Design	Building cities, using equipment tools, creating models, etc.
Automotive	Driving, renting a car, racing, loading, shipping, delivering, etc.
Education	Learning, teaching, making, studying, reading, writing, etc.
Fitness & E-Sports	Exercising, jogging, performing yoga, cycling, playing soccer, etc.
Livestreaming	Dancing, shouting, singing, going to music shows and concerts, etc.

Thirdly, users have diverse experiences while interacting with interfaces in metaverse solutions. These experiences can be categorized based on the variety and level of user engagement (Hillmann, 2021), which includes both mental and physical involvement (Dirin & Laine, 2018). Mental engagement involves full concentration on the platform and the use of short- and long-term memory, while physical engagement involves the use of various body parts to interact with the system. Olsson (2012) identifies six categories for the design and evaluation of XR solutions: UX instrumental, cognitive and epistemic, emotional, sensory, motivational, and social experiences [Table 3].

Table 3 Experience classification according to “engagement”

Categories	Descriptions
Instrumental experiences	Such experiences are characterized by the feeling of being able to perform tasks and activities with less effort, time, and resources.
Cognitive and epistemic experiences	These experiences are typified by awareness being manifested or gaining a new viewpoint on one’s immediate surroundings.
Emotional experiences	Such experiences are characterized by the feeling of being able to receive useful information supporting feelings of joy and amusement.
Sensory experiences	These experiences are typified by the feeling of being immersed and engaged in the interaction with the enriched environment.
Motivational experiences	These experiences are typified by the feeling of being cognitively stimulated, curious, and eager to try new things.
Social experiences	These experiences are participating in a user community and having novel social interaction and communication methods.

3. Methodology

3. 1. Data collection

We chose South Korea and the United States as our target countries for analysis because they are actively developing and conducting business in the metaverse. As a related work to examine regional differences, we referred a study analyzed data on virtual experiences and

found a radical change between two countries (Sung, 2022). The researchers used a search engine to collect keywords related to “virtual tourism” through region filtering and then applied text-mining techniques. Hence, we decided to deal with representative metaverse platforms which allowed two country’s users to cross time and distance to cover potential issues with cultural differences between countries. In South Korea, companies such as Naver and SK Telecom have launched their metaverse services Zepeto and Ifland, and the number of users is rapidly growing. In the US, Meta, Epic Games, Nvidia, Microsoft, and others are competing in the metaverse market and have the largest number of users in the world (SM Strategic, 2022). To collect quantitative data, it was important to carefully design the data collection methods and the set of keywords to maintain validity.

To define the metaverse trend and interest in the metaverse platforms relevant to RQ1, we first used Google Trends to track and analyze changing patterns in search volume over time in a specific country (A1). Google Trends provides a time series index of the search volume in a specific geographic location based on a large number of user search logs (Choi & Varian, 2012). However, it only displays the search volume in one country at a time, with a relatively normalized 0-100 scale. We, therefore, also had to use Google’s Advanced Search to identify the actual number of times “metaverse” was searched according to region and language settings (A2). We also extracted and counted the cases where the term “metaverse” and a specific platform name appeared at the same time (A3).

Since we planned to derive answers to RQ2 and RQ3 by collecting all online documents related to the metaverse, we first amassed raw data. We conducted data crawling with the term “metaverse” using our Python script for the last 5 years (B1). It crawled documents, news, reports, blogs, and titles and descriptions on YouTube over the past 5 years. The team refined their search by repeatedly filtering and modifying keywords based on the term “metaverse.” We concluded that extra keywords must be filtered to carefully extract experiences such as insights, abilities, and emotions in the context of online documents.

- Collection period: October 1, 2017 - September 30, 2022
- Target regions: South Korea and the US
- Channels: Web documents, news reports, blogs, YouTube titles and descriptions
- Data crawling and analysis tool: Python 3.11

As a result, we obtained the metaverse-related mention volume and documents that revealed specific metaverse activities for 5 years from October 1, 2017, to September 30, 2022, for South Korea and the United States. We additionally filtered “activity” search terms (B2) to derive activity keywords that mainly interested users for RQ2. Then, we categorized the activity keywords semantically to organize activity types. For RQ3 and RQ4, we collected the C dataset by filtering the categorized activity keywords and positive emotion words while using the B1 dataset to obtain specific descriptions of metaverse experiences.

3. 2. Data analysis process

Based on the collected data, we conducted both a text-driven quantitative analysis of the collected data and a qualitative analysis. The procedure for addressing our research questions was as follows.

RQ1) Degree of interest in metaverse

First, utilizing Google Trends' regional search, we found the search volume trend of the keyword "metaverse" and compared the two countries. Second, utilizing Google's Advanced Search, the frequency of the keyword "metaverse" was found by quarter to investigate the trend of interest in the metaverse over time. Third, word frequencies of the following eight representative metaverse platforms were derived to analyze users' levels of interest. We selected representative platforms that were launched simultaneously in South Korea and the United States at least two years ago as of October 2022 and had over a million monthly active users (MAU): Animal Crossing (42 million), Roblox (230 million), Fortnite (85 million), Second Life (1 million), Minecraft (165 million), Zepeto (2 million), Ifland (1.63 million), Gather Town (4 million) (Data Ai, 2023).

RQ2) Interesting activities in metaverse

After completing data cleaning and preprocessing, which removes stop words from a crawled raw dataset (B1), we filtered the data with the term "activity" to identify interesting metaverse activities that people frequently mentioned in the online environment. At this time, we utilized TF-IDF, which assigns a value to a term according to its importance in a document scaled by its importance across all documents in the corpus. Tang et al. (2022) investigated recent changes in experiences under the XR context through a comparative study, employing the TF-IDF. Marcinczuk et al. (2021) presented a paper in which TF-IDF outperformed word embeddings in similar cases, and it can adjust for the importance by increasing the value of a word in proportion to the number of times it appears in the document but offsetting it by the number of documents in the corpus that contain it (Beel et al., 2016). For these reasons, we determined that TF-IDF was suitable for our research.

Then, activity-irrelevant keywords such as prepositions and articles were removed, and the top 20 activity keywords were aligned. We compared and analyzed users' areas of interest in the metaverse activities between the two countries. In addition, as preliminary work for RQ3, we grouped the activity keywords into four categories of activity types by clustering semantically related texts.

RQ3) Positive user experiences

By filtering specific documents from the derived data (B1), we attempted to extract positive UX. To do this, we had to start by selecting emotional keywords. Plutchik's emotion model proposed 14 dimensions of emotional vectors (Plutchik, 1960), and based on this, Aoki and Uchida's research presented a list of 288 detailed emotional words (Aoki & Uchida, 2011). We extracted only positive emotions from this vocabulary and clustered them into colloquial expressions popularly used in each country. In this way, we selected six positive emotion words in English and its equivalent in Korean. However, when we filtered the data (B1) using only these positive emotion words with activity-related words, we ended up with many documents that did not explain users' experiences. In this case, many articles with future aspirational statements were included in the retrieval results. Our goal for RQ3 was to extract and analyze users' past experiences. Therefore, we decided to additionally filter documents containing the word "review". As a "review" is a judgment or discussion of something that includes individual opinions and user narratives in post-experience feedback, it was effective in excluding interpretations by third parties and future-oriented articles related to

aspirations and plans that did not reflect users' own experiences.

- Positive emotion words: fun, impressed, amused, satisfied, surprised, excited
- Example of keyword filtering: “metaverse,” “education,” “fun,” “review”

RQ4) Features of metaverse user experiences

We applied the Delphi technique to understand the characteristics of users' positive experiences derived from the extracted data. The Delphi technique leads to reliable measurement in developing new concepts and setting future research directions (Vogel et al., 2019). Sinnappan and Tay (2023) recommends panels between 5 to 10 in the fuzzy Delphi method (FDM) to gather the opinions of experts through three rounds of surveys to assess the level of agreement on specific issues. The Delphi process comprises a series of sequential questionnaires, interspersed by controlled feedback, which seeks to gain the most reliable consensus of an “expert panel” regarding the findings, particularly in relation to the credibility of the results (Hasson et al., 2000). Five experts in the field of UX and computer science participated in the Delphi panel. We included three Korean and two American members in the panel to ensure that opinions were not biased toward one side, considering cultural differences between countries. The information of the panel of experts is shown in Table 4.

Table 4 Information of Delphi panel experts

Nationality	Career length (years)	Education	Major
South Korea	14	PhD	User Experience
South Korea	12	PhD	Technology Management
South Korea	8	MS	Computer Engineering
USA	10	PhD	Human-Computer Interaction
USA	17	MS	Interaction Design

An expert evaluation was conducted to assess the features of users' positive experiences in the data (C). The evaluation used a scale based on three criteria commonly mentioned in the literature on UX in the metaverse. “Reality” in the metaverse context means an immersive, lifelike experience that allows users to suspend their disbelief and interact with a digital world as if it were real. “Continuity” in the metaverse refers to an experience that is not a one-time occurrence but a continuous and repeating event that can be done today, tomorrow, and the day after. “Social interactivity” means an interactive experience such as communication and social activity that occurs between multiple users. For the Delphi survey, the experts were asked to rate the protocol on a 5-point Likert scale on the criteria of reality, continuity, and social interactivity, as shown in Table 5.

Table 5 Questionnaire criteria for Delphi technique

Criteria	Questions	From 1 to 5
Reality	Is it a real-life or unrealistic experience?	Unrealistic (←) Realistic
Continuity	Is it a temporary or repeatable experience?	Transient (←) Constant
Social Interactivity	Is it a personal or interactive experience?	Individual (←) Interactive

The research team summed up the scores for those three criteria in each experience category (C) derived in Q3 and calculated average scores. In the second round of the survey, the research team shared the resultant average scores with the experts and encouraged them to freely share their opinions for and against through an online meeting. In the third round, the research team modified the resultant values reflecting the experts' opinions, reshared the data to collect the experts' opinions again, and finally put together the opinions. To indicate the data collection and analysis at each stage, we assigned symbols from A to C according to research questions in Figure 1.

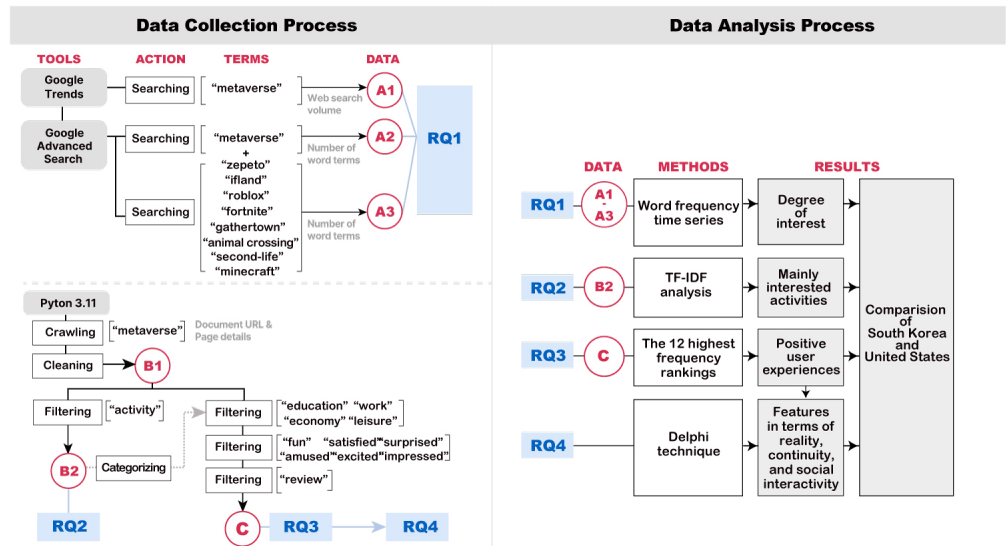


Figure 1 Data collection and analysis process

4. Findings

4. 1. Interest in metaverse and its platforms

4. 1. 1. Keyword Search Volume of “Metaverse”

Figure 2 shows the levels of interest in the metaverse of Korean and American users investigated on Google Trends. According to the results, in the case of South Korea, the web search volume increased steadily from September 2020, reached its peak in November 2021, and gradually decreased thereafter. In the case of the United States, unlike South Korea, the web search volume increased only slightly until September 2021 and then soared very suddenly in October 2021, the approximate point at which South Korea showed a 100% increase. It was at this time that Facebook changed its name to Meta, which apparently influenced the web search volume.

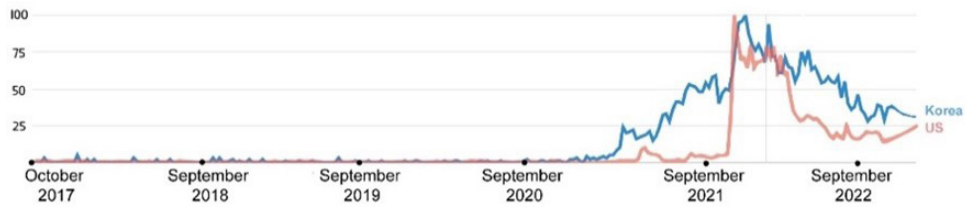


Figure 2 Comparison of “metaverse” search volume

4. 1. 2. Word Frequency of “Metaverse”

The levels of interest in the metaverse of Korean and American users over the last 5 years were examined through the frequency with which the keyword “metaverse” appeared on the web. Looking at the quarterly trend in South Korea, the keyword appeared a total of 14,349,900 times. There was a low level of interest in the metaverse from the fourth quarter of 2017 to the second quarter of 2021, even though Zepeto, the Korean metaverse platform, was launched and service provision began in March 2018 (Naver, 2022). The frequency of web appearances began to increase in the third quarter of 2021. This time point also came after “Digital New Deal 2.0,” a set of policies and initiatives, was announced by the South Korean government in 2021, aimed at accelerating the country’s digital transformation and building metaverse open sources (Ministry of Economy and Finance, 2021). At the time, Zepeto hit 300 million registered global users and recorded 2 million creators (Naver, 2022). In case of the United States, the keyword “metaverse” appeared a total of about 51,583,900 times, which is about 3.5 times more than in South Korea. When we compared the populations of the two countries, as of 2021, the population of the United States was approximately 331 million and that of South Korea was approximately 51 million (The World Bank, 2023). Although the population of the United States was about 6.5 times larger than that of South Korea, the difference in word frequency was about 3.5 times during the same period, indicating that user interest in South Korea was higher than that in the United States. As for the quarterly trends, from the fourth quarter of 2017, the initial time point of the trend investigation, the frequency of 86,400 was already shown in the United States, indicating a level of interest at least 3 times that of South Korea. Thereafter, the frequency gradually increased, showed remarkable increases in the second quarter of 2018 and the second to the third quarter of 2019, and showed some decreasing trends thereafter. As with South Korea, the frequency increased rapidly from the third quarter of 2020, and the continuous rising trend began from the time at which Nvidia launched Omniverse Cloud. Moreover, it was maintained until the first quarter of 2021 when the metaverse platform “Roblox” was listed and the third quarter of 2021 when Facebook changed its brand name to “Meta.” In the second quarter of 2022, when South Korea reached its peak, the United States reached its peak with a frequency of 8,590,000, about 3 times that of South Korea.

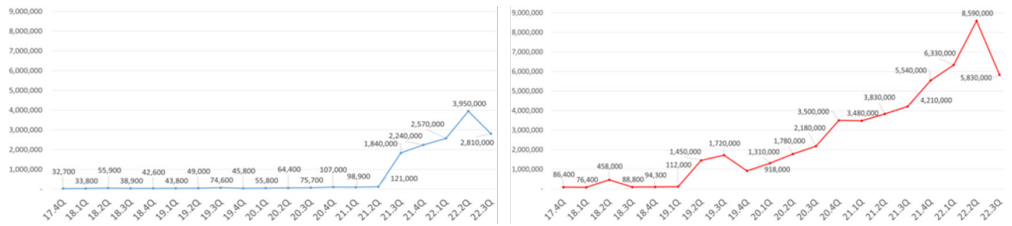


Figure 3 Quarterly trend of “metaverse” frequency (South Korea/left, United States/Right)

4. 1. 3. Word Frequency of Metaverse Platforms

To concretely examine the levels of interest in the representative metaverse platforms for the last 5 years and analyze the differences between the two countries, the combined keyword metaverse and platform names (e.g., “metaverse” and “Roblox”) were set for quarterly advanced searches to determine the word frequencies on the web.

In case of South Korea, the levels of interest in Zepeto and Roblox as well as Animal Crossing soared from the fourth quarter of 2020 to the second quarter of 2022. In addition, the levels of interest in Ifland and Gather Town, which were newly launched in the first quarter of 2021, showed steady rising trends from the second quarter of 2021. These two platforms both have an online collaboration tool that allows for real-time video transmission with a camera and easy customization to build virtual lands. In addition, in South Korea, the number of mentions of Fortnite and Second Life tended to be very low.

In the case of the United States, the level of interest in Minecraft was overwhelmingly high, followed by Second Life, Roblox, and Fortnite in that order. Second Life, which was released in 2003 and is called the origin of the virtual world, was continuously mentioned with the keyword “metaverse.” On the other hand, the platforms Zepeto, Ifland, and Animal Crossing developed in Asia received low interest in the US. Overall, compared to Korea, in the US, there was about 3 times as much data mentioning the specific platform names, and the types of platforms in which users were interested were completely different.

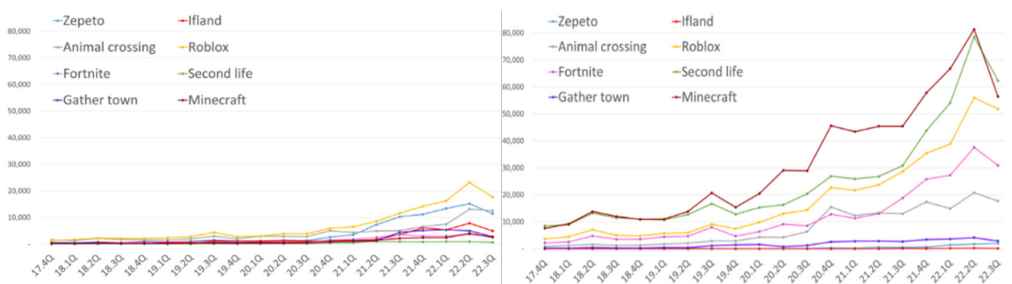


Figure 4 Frequency trends of metaverse platforms (South Korea/left, United States/Right)

4. 2. Level of interest in metaverse activities

This section presents the results of the analysis of the differences between South Korea and the United States in terms of the types of metaverse activities that received high levels of interest. The documents related to the metaverse were collected with crawling using “metaverse” (B1). We filtered the data with the term “activity” and analyzed it using the

TF-IDF method. The resulting value revealed the relative frequency of a word in a specific document compared to the inverse proportion of that word over the entire document corpus. The derived data (B2) of the two groups were given weights through a TF-IDF analysis to evaluate the relative importance of activity terms and then compare and analyze the data from the two countries. In addition, we removed stop words, such as postpositions and adverbs that were not relevant to the metaverse experience terms, from all the data obtained through TF-IDF and adopted words suitable for explaining the types of metaverse activities. The top 20 words with the highest weights are shown in Table 6.

Table 6 Results of Top 20 Keywords from metaverse activities

No.	South Korea		United States	
	Keywords	TF-IDF	Keywords	TF-IDF
1	Travel	0.014505021	Work	0.009221884
2	Game	0.013055456	Play	0.008142887
3	Education	0.010515155	Blockchain	0.005693177
4	Work	0.009229774	NFT	0.004840776
5	Culture	0.008006758	Learn	0.004387009
6	Finance	0.007885265	Network	0.003958877
7	Economy	0.007711517	Art	0.003856078
8	Hotel	0.007269694	Economy	0.003753881
9	Design	0.006730427	Invest	0.003457539
10	Bank	0.006065352	Architecture	0.003360728
11	School	0.005924588	Book	0.003309512
12	Mobility	0.005807251	Team	0.003293373
13	Health	0.005572071	Show	0.003283696
14	Exhibition	0.00525762	Bank	0.002948506
15	Entertainment	0.005034799	Cryptocurrency	0.002560446
16	Blockchain	0.00451333	Office	0.002536053
17	Academy	0.004194773	Custom	0.002518975
18	Company	0.004194773	Entertainment	0.002515408
19	Event	0.003759611	Estate	0.00237422
20	Job	0.003737273	Design	0.002289113

According to the results of the study, in South Korea, “travel” was the most important followed by “game,” “education,” and “work.” In addition, keywords related to “finance” and “bank” showed relatively high values, and those related to leisure activities such as “hotel,” “health,” “exhibition,” and “entertainment” also showed remarkably high scores.

In the case of the US, “work” ranked first, indicating a high level of interest in the metaverse as a tool to be utilized in work and team collaboration. In addition, as with South Korea, most of the scores for keywords related to economic activities, such as “blockchain,” “NFT,” and “bank,” were high. On the other hand, unlike in South Korea, the levels of interest in keywords related to creative activities, such as “art,” “architecture,” and “custom,” were high, and keywords for recreational activities, such as “entertainment” and “show,” also stood out. In both countries, the words “bank,” “work,” “economy,” “entertainment,” “design,” and “blockchain” appeared. In addition, words with similar and connected meanings, such as “education and learning,” “company and office,” and “event and show,” were shown in the two countries.

Figure 5 shows the process of placing semantically close words to group and categorize them. The metaverse activities of interest in both countries were grouped into the following four categories: “education,” “work,” “leisure,” and “economic.” We have established the representative category of “education” as a term encompassing learning, study, and creative activities. We have chosen the term “work” to represent activities related to professional tasks, job-seeking, and occupations. The category “economic” is associated with finance, consumption, investment, and business. For play, travel, and cultural activities, we have set the category as “leisure”. These categorizations have been integrated into the study to provide a comprehensive framework.

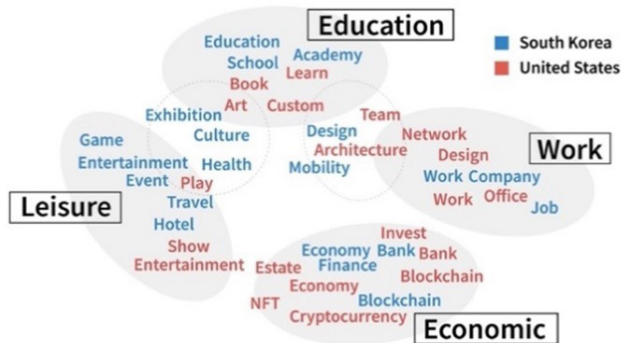


Figure 5 Four types of metaverse activities

4. 3. Positive user experiences in metaverse

Based on the metaverse-related basic data (B1) that we crawled earlier, we filtered an additional six positive emotion words to understand the positive cases of UX in the metaverse. The top 12 experiences were derived for each of the four kinds of metaverse activity (education, work, leisure, economic) commonly included in South Korea and the US mentioned above (C). To identify the features of UX, the refined data from South Korea and the United States were compared in terms of reality, continuity, and social interactivity by category. In addition, to compare the characteristics of UX in detail, we also investigated which platform the experience mainly occurred on and the country in which the platform was developed.

4. 3. 1. User experiences in education category

Regarding the “education” category, Korean users mainly engaged in online learning to complete distance education during the COVID-19 period on the platforms Zepeto, Ifland, and Gather Town, focusing on secondary and higher public education. Users enjoyed participating in events such as matriculation ceremonies, graduation ceremonies, large-scale lectures, and festivals where many people gathered. We also found that most of the experiences involved visiting places that are geographically difficult to access, such as experiential learning, field study, exhibition, and historical sites, using the Minecraft platform, showing that on-site classes were replaced by virtual on-site learning within the metaverse. In the case of the US, artistic and creative educational experiences were dominant, and as for platforms, new ones such as The Fabricant, Universal, and Spatial,

which specialized in educational functions, were mainly used. Teachers positively rated the potential for using metaverse content as educational materials in various areas, including explanations of invisible things and phenomena. Students particularly welcomed the opportunity to receive high-level engineering and safety education. Moreover, the users responded positively because participants could communicate immediately with experts. Table 9 presents the results of a comparative study of positive UX in the education category.

Table 9 Results of positive “education experiences”

No.	South Korea		United States	
	Experience	Platform	Experience	Platform
1	Attending graduation ceremony/exhibition	Minecraft (Sweden), Gather Town (US) Ifland, Zep (Korea)	Going to the library, finding books	Minecraft (Sweden) Second Life (US)
2	Going to science expo	Zepeto, LG U+(Korea)	Creating fashion items	The Fabricant (Netherlands)
3	Taking mathematics class	Gather Town (US)	Going to art galleries	Spatial (US) Multiverse (Singapore)
4	Listening to lectures	Ifland (Korea)	Taking exams	Skittish (US)
5	Going to historical sites	Minecraft (Sweden)	1-on-1 personalized learning	Cosmos (US)
6	Building historical architecture	Minecraft (Sweden)	Building accurate 3D models	CoSpaces (Germany)
7	Learning how to prevent dementia	Zepeto, Ifland (Korea)	Performing microscope simulations for biology education	Univirtual (US)
8	Attending field trip to world cultural heritage sites	Minecraft (Sweden)	Collecting historical learning materials	Spatial (US)
9	Participating in software boot camp	Gather Town (US)	Undergoing lifesaving/safety training	Safeverse (Germany)
10	Assembling a machine part	Spatial (US) Class VR (US)	Whiteboarding	Virtual X (Malaysia)
11	Taking university-industry cooperative course	Ifland (Korea)	Making sculptures in exhibition program	Decentraland (US)
12	Learning foreign languages	D&P Corporation (Korea)	Participating in medical and nursing training	Microsoft HoloLens (US)

4. 3. 2. User experiences in work category

Regarding the “work” category in the metaverse, in the case of South Korea, service operators tended to implement the entire company space using large platforms such as Zepeto and Ifland and mainly held special events such as new employee orientation/training and forums. In addition, employees of startups and small businesses used virtual work-oriented platforms to overcome the limitations of small offices. Specialized functions such as document search and sharing for ease of use brought positive responses from office workers at corporations and public institutions. In the United States, users preferred functions that enabled them to have unusual work experiences in the office, such as spending time at travel destinations. The users showed interest in creative work activities, such as customizing their workspace or creating ideas on the spot and sharing them on social media. Table 10 presents the positive work experiences of the two countries’ users in the work category.

Table 10 Results of positive “work experiences”

No.	South Korea		United States	
	Experience	Platform	Experience	Platform
1	Visiting company offices	Zepeto (Korea)	Creating artwork, sharing on SNS	Gravity Sketch, Tilt Brush, Meta Horizon Workrooms (US)
2	Participating in recruitment fair	Ifland (Korea)	Joining business meeting	Meta Horizon Workrooms (US)
3	Completing employee orientation	Zepeto (Korea)	Completing employee training	Microsoft Mesh (US), SynergyXR (Denmark)
4	Communicating with government officers	Ifland (Korea)	Sharing screens and sending files to experts	Microsoft Mesh (US)
5	Meeting clients via virtual chat	Ifland (Korea)	Giving conference presentation	Mytaverse, Spatial, AltSpaceVR (US)
6	Attending matriculation ceremonies	Gather Town (US)	Visiting client’s workplace	Meta Horizon Workrooms (US), Arthur (Germany)
7	Creating own virtual office	Zepeto, Soma (Korea)	Collaborating with team via workshop	Arthur (Germany)
8	New employee training	Zepeto (Korea)	Having interviews, engaging in part-time work	Meta Horizon Workroom, Roblox (US)
9	Having coffee breaks in coworking space	Soma (Korea)	Managing factories with testing	Ansys Twin Builder (US)
10	Using virtual computers for document work	oVice (Korea, Japan)	Operating telescope in customized offices	Meta Horizon Workrooms (US)
11	Performing new product reviews	Meta-police (Korea)	Sharing video call during meeting	Meta Horizon Workrooms (US)
12	Working remotely while listening to favorite music	Soma (Korea)	Co-editing shared documents	Meta Horizon Workrooms (US)

4. 3. 3, User experiences in economic category

As for the “economic” category, in South Korea, financial companies preferred to use platforms such as Roblox and Zepeto to arrange one-off point-giving events or provide bank consultation-oriented services. Dokdo-verse and Shinamon are examples of such platforms specialized in finance. Korean users preferred banking experiences in a virtual space that could replace banking in the real world. They took advantage of virtual banking services, such as payments, transactions, and loans, by linking them with real-world assets. In the US, new platforms specialized in finance and financial management functions were extensively utilized. Among them, Decentraland enabled users to open blockchain-based virtual accounts so that they felt interested in participating in NFT auctions or purchasing virtual spaces using the currency of the virtual wallet. American users were more interested in economic experiences that included the concept of gamification. When users performed game quests in a specific space, they could receive cryptocurrency. They received compensation for collecting game characters and storing gift coupons. Table 11 presents the comparative results of positive UX in the economic category.

Table 11 Results of positive “economic experiences”

No.	South Korea		United States	
	Experience	Platform	Experience	Platform
1	Communicating with customers	Zepeto (Korea), Gather Town (US)	Enjoying e-shopping	Roblox (US), Shopify (Canada)
2	Visiting branches of a bank	Shinamon, Dokdo-vers (Korea), Minecraft (Sweden)	Selling artwork and fashion items	RTFKT Studio, Decentraland (US)
3	Getting a loan	Roblox (US)	Buying real estate	Earth2 (Australia), Decentraland (US)
4	Gaming for credit rating	Roblox (US)	Trading and sharing real-time financial data	Fortnite, Citi Holographic Workstation (US)
5	Exchanging virtual tokens for merchandise	Dokdo-verse (Korea)	Using ATMs for payments and transactions in virtual branches	Meta, Decentraland, Centric (US)
6	Finance management consulting	Ifland (Korea)	Implementing blockchain-based smart contracts	Decentraland (US)
7	Applying for a credit card	Zepeto (Korea)	Engaging in foreign exchange and safekeeping	Accenture (US)
8	Buying a soundtrack license	BNK (Korea)	Financial consulting	Auto Navigator (US)
9	Buying smartphone data	LG U+ (Korea)	Buying digitally curated NFTs at auction	Decentraland (US)
10	Buying an insurance policy	Gather Town (US)	Managing bank accounts using crypto wallets	Decentraland (US)
11	Selling custom clothing and earning cryptocurrency	Zepeto (Korea)	Gaming in retail space and getting gift cards	Meta (US)
12	Buying groceries and using coupons in cvs	Shinamon (Korea) Roblox (US)	Battling, collecting, and trading NFT characters	Axie Infinity (Vietnam)

4. 3. 4. User experiences in leisure category

As for the “leisure” category, most of the users in South Korea utilized the platform Zepeto to enjoy traveling in unusual spaces. For example, some appreciated camping, fishing, and living on an island, transcending time and space constraints. The users positively perceived experiences in which they could move the avatar in a virtual space to perform physical activities, such as hiking, rock climbing, and swimming. In the US, game production-based platforms such as Fortnite and Roblox were mainly used for participating in leisure experiences. The users were fascinated by experiences that allowed them to create a surreal virtual world with certain themes, such as the Marvel and Batman worlds, in some spaces within the metaverse map and participate in it. They showed positive responses to unrealistic experiences of dancing with strangers and communicating with celebrities at large concerts. In addition, leisure experiences, such as playing intense sports (e.g., soccer, baseball, racing), performing yoga, and meditating with community members, mainly appeared. Table 12 presents the comparative results of positive UX in the leisure category.

Table 12 Results of positive “leisure experiences”

No.	South Korea		United States	
	Experience	Platform	Experience	Platform
1	Camping	Zepeto, Zep (Korea)	Dancing and singing	Fortnite, Spatial, Wave (US)
2	Farming	Zepeto (Korea) Gather Town (US)	Playing soccer and baseball	Roblox (US) Soccer City (Switzerland)
3	Watching movies	Zepeto (Korea) Gather Town (US)	Driving a racecar	Roblox, Fortnite, Rec Room (US), Infinite Drive (Canada)
4	Hiking, climbing	Zepeto (Korea)	Playing fetch with a dog	Roblox, VR chat (US)
5	Solving mazes	Gather Town (US) Zepeto, UStory (Korea)	Swimming in the ocean, enjoying waterparks	Roblox, Meta Horizon Workrooms (US)
6	Fishing	Zepeto, Dokdo-verse (Korea)	Taking pictures in photo booths with friends	Roblox (US)
7	Staying at a hotel	Zepeto (Korea)	Attending film festivals	Roblox (US)
8	Swimming	Zepeto (Korea)	Enjoying musical performances and shows	Roblox, Fortnite (US)
9	Visiting a theme park	Zepeto (Korea)	Practicing yoga and meditation	Roblox (US)
10	Visiting and traveling to islands	Zepeto (Korea)	Traveling in outer space	Fortnite, Virbela, Decentraland (US)
11	Exercising in fitness centers	MetaGym (Korea)	Skiing and getting on ski lifts	Roblox (US)
12	Cooking and eating food	Roblox (US)	Playing casino games	Decentraland (US)

4. 4. Features of user experiences in metaverse

This study compared and analyzed the characteristics of the experiences of Korean and American users to understand their interests and the attributes of their experiences. We discussed characterized points of UX in terms of reality, continuity, and social interactivity. Figure 6 shows differences in the characteristics of UX in the education category. From the “reality” perspective, the expert evaluation of the characteristics of experiences showed that both countries provided realistic educational experiences as well as unusual ones that could not be offered in real-world classes at similar rates. In terms of “continuity,” Korean students mainly had one-off and event-like experiences, such as events at educational institutions and job fairs. On the other hand, in the case of the US, it was discovered that experiences that teachers could use as educational tools on an ongoing basis and those in which students could engage in learning for extended periods were offered. As for the “social interactivity” aspect, both countries provided similar levels of personal and interactive experiences.

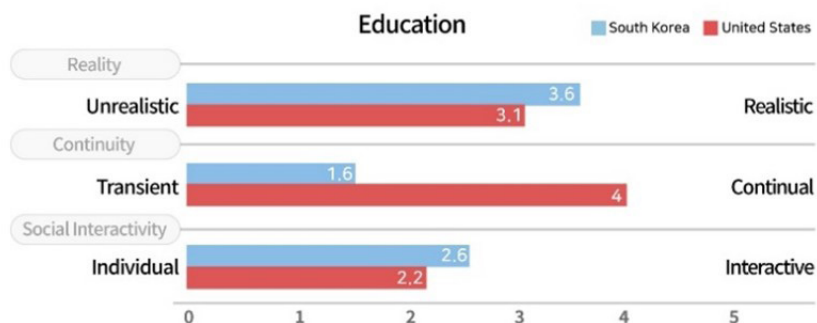


Figure 6 Comparison of positive education experiences

Figure 7 depicts the differences in the characteristics of work experiences between the two countries. In terms of “reality,” it was found that in the South Korean case, highly realistic experiences that can be utilized immediately in reality and are useful in relation to work achieved a high score of 4.5 points. Regarding the “continuity” aspect, non-face-to-face services such as Zoom and conference calls were mainly used, and metaverse platforms were used only occasionally. On the other hand, in the case of the US, metaverse platforms were continuously used in daily life as a substitute for the non-face-to-face solution platform. The research showed a high score of 3.8 points. In the aspect of “social interactivity,” American users showed a very high score at 4.4 points since the metaverse facilitated artistic/creative work and SNS activities.

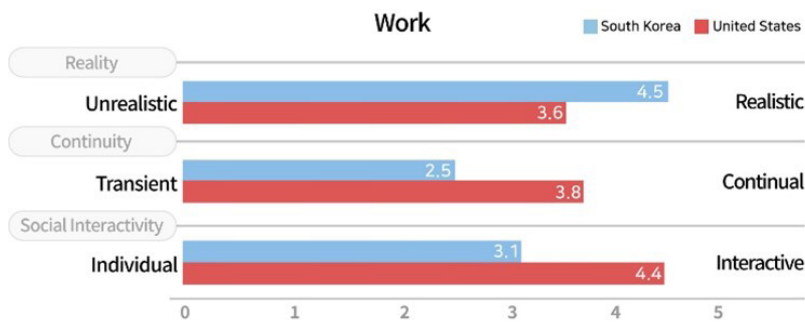


Figure 7 Comparison of positive work experiences

Figure 8 shows differences in the characteristics of UX in the economic category. The comparison of “reality” in the two countries revealed that South Korea focused on more realistic financial transaction activities than the US in the metaverse. American users desired to make virtual assets and buy and sell special items with idealistic content in the virtual world. In terms of “continuity,” American users tended to prefer activities that enabled sustainable banking operations more than South Koreans. As for “social interactivity,” we found that both countries mainly conducted personal economic activities and financial management regarding information and security rather than social activities.

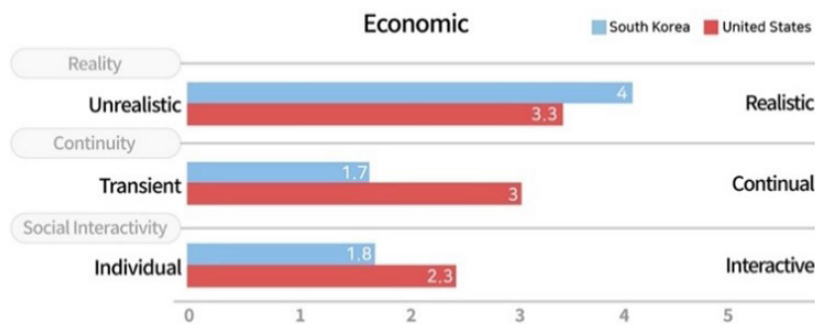


Figure 8 Comparison of positive economic experiences

Figure 9 shows differences in the characteristics of UX in the leisure category. In both

countries, users' leisure experiences showed neutral rates, with realistic and unrealistic experiences appearing simultaneously in the "reality" aspect. As for "continuity," the users tended to continuously pursue new event-like experiences. The users preferred leisure experiences for self-management in daily life, such as yoga and swimming. At the same time, they desired one-off event-type experiences, such as visiting an amusement park, and attending a live concert, in search of more thrilling experiences. In terms of "social interactivity," the users in the US showed higher rates of sports and leisure activities conducted in teams, while in Korea, solo leisure activities tended to be more prevalent.

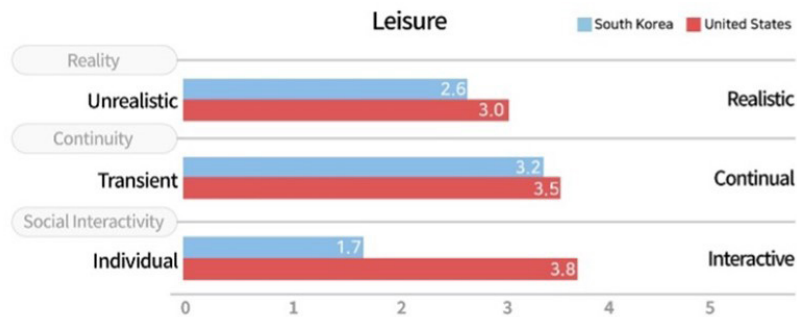


Figure 9 Comparison of positive leisure experiences

In addition, we synthesized the results of the four categories and compared the characteristics of positive UX of Korean and American users according to the three evaluation scales, as shown in Figure 10. When considering the "reality" aspect, there were significant differences in the work and economic experiences between the users in South Korea and the United States. In South Korea, virtual experiences closely resembled real-life experiences, thereby minimizing the difference between the virtual and real worlds. In contrast, users in the United States preferred surreal virtual experiences that differed from reality and could only be experienced in the virtual world. Regarding "continuity," Korean users leaned toward short-term experiences in the education, work, and economic categories. In South Korea, most virtual experiences were one-time events in which many people temporarily gathered, such as festivals and forums. This was particularly true of events in the education and economic categories, such as matriculation and graduation ceremonies. In contrast, users in the United States showed positive feelings toward virtual experiences that enabled them to participate consistently in daily life rather than experiences that ended in one session. Metaverse content producers and users in the education and work categories devised sustainable solutions that could serve as alternatives to non-face-to-face platforms like Zoom and WebEx.

Lastly, "social interactivity" varied by category. In South Korea, education, economic, and leisure experiences focused on individual learning and convenience rather than mutual exchange. Korean users experienced the most positive emotions when engaging in individual experiences. In contrast, users in the United States tended to be actively engaged in interactive experiences, exchanging, and sharing work and leisure experiences. However, both countries had less social interaction and more personal experiences in

the economic category compared to the other categories, perhaps because banking and e-commerce are mainly focused on individual transactions. It showed that the economic industry in the metaverse has evolved around activating the function of the platform centered on a personal business model rather than a collaborative working model.

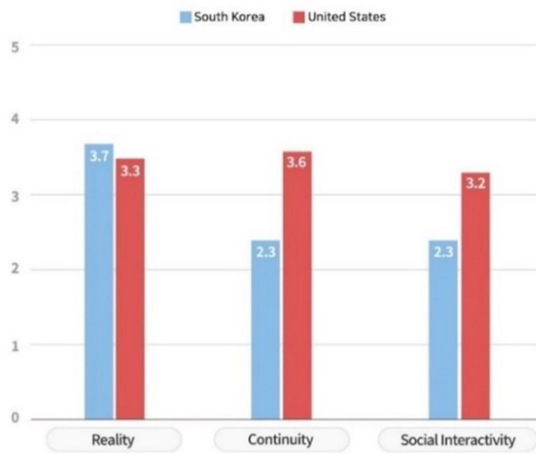


Figure 10 Comprehensive comparison in terms of reality, continuity, and social interactivity

5. Conclusion

As the metaverse platform industry continues to grow, it is expanding into a wider range of application areas, such as education and manufacturing. It is expected that users will spend more time in the metaverse and have more virtual experiences related to real-life economic and social activities.

This study began with the question of whether there are national differences in metaverse users' positive experiences. Overall, we identified that users tend to prefer platforms developed in their own countries. This may be because these platforms were designed with content and features that reflect the society and culture of the users, resulting in a more optimized UX.

As implications of these results, first, the metaverse has the potential for infinite experiences by creating value co-creation led by different users. The experiences in the metaverse will constantly evolve to increase users' satisfaction, considering different user characteristics. Hence, accessible research based on the analysis of specific user groups is required to attract users' attention.

Second, through the results of this study, we found that the characteristics of users' desired experiences in South Korea and the US were very different. Despite the fact that the metaverse is a platform that can connect the world without spatial and temporal barriers, it is necessary to design the experience content considering the social and cultural preferences and characteristics of the users in each country.

Third, it is meaningful that this study compared the characteristics of experiences in that we took a mixed methods approach, conducting both a qualitative analysis by experts and a

data-driven quantitative analysis. Moreover, this study explored the characteristics of users' experiences in Korean and American society over a substantial 5-year period, while previous studies collected data over relatively short periods.

On the other hand, as a limitation of the study, we identified the characteristics of experiences only through users' opinions from online documents, such as blogs and web news reports. Consequently, our ability to acquire detailed impressions about personal feelings on genuine experiences was limited. Therefore, future studies should expand the research through in-depth user interviews or questionnaires. Considering the ethnographic and sociocultural background status, specific evidence on the differences in positive experiences can be determined.

We tried to deliver empirical knowledge by comparing the countries and platforms based on the users' opinions and experts' judgments. It is expected that the results of this study will serve as fundamental data to analyze the characteristics of the experiences in which metaverse users are interested. Furthermore, they will help to examine the correlation between metaverse experiences. The proposed research agenda can lead to insights into the current metaverse market status and future direction of application in various industries.

Further academic analysis is necessary on how desired experiences can operate interactively within the virtual worlds and daily life from the perspective of scalability. Furthermore, additional research on how positive or negative metaverse experiences affect users' behaviors and emotions needs to be conducted.

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