

INTERNATIONAL JOURNAL
of
CONTEMPORARY
EDUCATIONAL RESEARCH

JCER

International Journal of Contemporary Educational Research (IJCER)

www.ijcer.net

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Article History

Received: 13.01.2023

Received in revised form: 22.12.2023

Accepted: 25.12.2023

Article Type: Research Article



To cite this article:

Yiğit-Tekel, K. & Yaman, Y. (2023). Metaverse risk perceptions of gifted students. *International Journal of Contemporary Educational Research*, 10(4), 1035-1049. <https://10.52380/ijcer.2023.10.4.355>

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Metaverse Risk Perceptions of Gifted Students

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Abstract

This research aims to examine the views of gifted secondary school students about the metaverse and their risk perceptions toward the digital environment. In this context, the study group, consisting of 55 gifted students, was determined through purposive sampling. A survey was used to collect participants' views on the metaverse, and the "Virtual World Risk Perception Scale" was used to measure the risks they felt in digital environments. A mixed-methods approach was used in this research. Content analysis was used in the qualitative data analysis, and the ANOVA test and t-test were used in the quantitative data analysis. The findings obtained in the analysis showed that students defined the metaverse as a virtual universe, virtual reality, commerce, and socializing place. It was seen that the place where they met this concept was social media. While the students stated that the use of the metaverse in education could have advantages, such as motivation, a fun learning experience, and a contribution to personal development, they also mentioned disadvantages, such as health problems, addiction, safety, ethics, and disconnection from real life. Virtual-world risk perceptions did not differ according to gender or class level. Students who did not have metaverse experience stated that the digital environment had a higher risk of corruption compared to those with experience.

Keywords: Education, Gifted and talented, Metaverse, Risk perception

Introduction

Today's students have different characteristics from the past, and education methods and techniques have also changed. However, the 21st-century education environment is still similar to the environment that has been present since the early ages. Despite these changing conditions, new and effective approaches to education are needed instead of creating education programs with a traditional understanding.

Gifted students, who are known to be few in the general student population, have similar needs to their normal, developing peers. On the other hand, they have different educational needs arising from differences in abilities and interests. Gifted students need to structure the environments where their intellectual peers are present to enrich the program, differentiate it, group it, and include high-level thinking skills in the process (Emir, 2021).

Due to the educational needs of gifted individuals, there is a need for differentiation in education programs. The use of technology is a strategy that helps gifted students access the basic knowledge and standards of the field in their education programs. Online learning opportunities are crucial to meeting the needs of gifted students for depth and complexity in education. With online learning, a homogeneous grouping of gifted individuals can be achieved. Thus, the social relations of the students are also positively affected. On the other hand, gifted students need individualization. At this point, online learning provides students with the opportunity to work independently according to their own abilities and supports them to be autonomous learners (Potts, 2019; VanTassel-Baska, 1994).

Within the scope of technology integration in the metaverse environment, which has been the subject of curiosity recently, "Can the metaverse environment provide a new educational field for gifted students?" raises the question. The metaverse is a surreal universe that brings together physical reality and digital reality and has access to more than one person (Mystakidis, 2022). In the metaverse environment, education is expected to differentiate the environment and the teaching method, process, and product.

Traditional educational environments have some limitations. These are low self-perception, loss of attention in long meetings, students remaining passive in the learning process, and students' transfer of emotions being limited (Mystakidis, 2022).

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It is expected that the development and use of metaverse-based education models will reduce the limitations of two-dimensional platforms in education. Using three-dimensional software and computers supports students' abstract and complex thinking. At the same time, it will provide an active learning experience as the student will personally take part in the process (Mystakidis, 2022; Potts, 2019).

The virtual learning experience has an impact on individuals of all ages, starting in the pre-school period. Students are highly vulnerable to anticipated or unpredictable risks. The inclusion of the new metaverse in education, which is still in its formation stage, has some risks. It includes risks, advantages, and disadvantages (Arslankara and Usta, 2018; 2020). It is very worthwhile to discuss the risks of metaverse-based education beforehand. In this context, the advantages of metaverse-based education are given in Table 1.

Table 1. Advantages of metaverse-based education

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- Eliminates traditional education limitations (Mystakidis, 2022).
 - Provides active and collaborative learning experience (Diaz et al., 2020; Kye et al., 2021; Mystakidis, 2022).
 - It provides a democratic atmosphere in education (Mystakidis, 2022).
 - Eliminates geographical restrictions (Mystakidis, 2022).
 - Participation in education opportunities can be provided on equal terms worldwide (Mystakidis, 2022).
 - Provides the freedom to produce and share (Kye et al., 2021).
 - New social communication and interaction space (Collins, 2008; Kye et al., 2021; Schlemmer & Backes, 2015).
 - For rehearsal and implementation of activities with a high risk of failure and serious consequences (Bailenson, 2018).
 - Develops abstract and complex thinking skills (Templeton & Kessinger, 2020).
 - Scientific thinking skills are developed (MacCallum & Parsons, 2019).
 - Provides a learning experience by increasing motivation (Tili et al., 2022).
-

Although metaverse-based education offers opportunities for the educational environment and students, it can also contain potential threats. Understanding these threats is crucial in terms of determining the measures to be taken against negativity in the future. Possible threats of metaverse-based education are weaker social communication, violations of privacy, committing cybercrimes, harming identity development, and an inability to adapt to the real world (Kye et al., 2021).

Regarding these risks, educators and all stakeholders have a primary responsibility. The educators of the gifted should provide professional development within the scope of technology integration and should search for technological opportunities in education (VanTassel-Baska, 1994). To prevent the abuse of the metaverse, which is expected to be the educational environment of the future, some preventive studies should be conducted (Table 2).

Table 2. Measures to be taken against the risks of metaverse-based educational environments

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- To transfer the augmented reality experience of teachers to education, technical support should be provided and appropriate vocational training should be provided (MacCallum & Parsons, 2019; Talan & Kalınkara, 2022; Tili et al., 2022).
 - To transfer the augmented reality experience of teachers to education, technical support should be provided and appropriate vocational training should be provided (Kye et al., 2021).
 - Teachers should design their classrooms in collaboration with students to develop students' problem-solving skills and enable them to produce unique projects (Kye et al., 2021; Tili et al., 2022).
 - Platforms should be created to prevent misuse of data by students and improved security measures should be taken (Kye et al., 2021; Hovan George et al., 2021; Wisnu Buana, 2023).
 - Metaverse-based education should be designed in an accessible and inclusive way for all students (Tili et al., 2022).
-

When the literature is examined, some research with metaverse and educational content has been conducted. Since the metaverse is a developing environment in education, literature reviews are more common than experimental studies (Akpınar & Akyıldız, 2022; Alkan & Polat, 2022; Altunal, 2022; Göçen, 2022; Gülen, Dönmez, & İdin, 2022; Sarıtaş & Topraklıkoğlu, 2022; Tili et al. 2022). A few surveys and experimental studies

are available. A few of them are as follows: MacCallum and Parsons (2019) examined teachers' attitudes towards this environment; Gündüz et al. (2022), on the other hand, focused on university students' perceptions of crypto art; and Özdemir et al. (2022) also investigated university students' views on the metaverse.

Quantitative studies on the metaverse and education are mostly conducted on university students and teachers. However, to our knowledge, no metaverse studies have been found for pre-higher education and gifted students. This research aims to examine the views of gifted secondary school students about the metaverse and their risk perceptions toward the virtual environment. In line with this main purpose, answers to the following questions were sought:

1. What are the opinions of gifted students about the metaverse?
2. Does the virtual world risk perception of gifted students differ in terms of gender and class level?
3. Does the virtual world risk perception of gifted students differ significantly according to their metaverse experiences?

The metaverse platform can be used to develop gifted education or to create new programs, thereby diversifying opportunities for gifted students. This study is crucial to understand the metaverse perceptions of gifted students and the risks they contain and to offer precautions and future solutions for these risks. In addition, this study aims to raise awareness about the metaverse in education and contribute to all education stakeholders.

Method

Research Model

The mixed method, which used quantitative and qualitative data collection techniques, was used in this research. The mixed method is the method in which the researcher adopts a quantitative and qualitative approach, collects and analyzes data, brings together the findings, and makes inferences about the future (Tashakkori & Creswell, 2007). The main reason for choosing the mixed method in the current research was to provide a more detailed and comprehensive understanding of the views and risk perceptions of gifted individuals regarding the metaverse than the information obtained through qualitative or quantitative methods alone (Creswell, 2008).

Study Group

The study group for this research was formed by the purposive sampling technique. For in-depth information, students interested in technology who were willing to participate in this study were included (Büyükoztürk et al., 2016; Clark & Bryman, 2019), and 55 gifted secondary school students studying at a Science and Art Center in Istanbul in the 2022-2023 academic year were included in this study. Students were coded as S1, S2,..., S54, and S55 (Table 3).

Table 3. Descriptive Analysis Results of Students' Personal Information

Variables		f	%
Gender	Female	23	41,82
	Male	32	58,18
	Total	55	100
Grade Level	6	20	36,37
	7	35	63,63
	Total	55	100

As shown in Table 3, 55 students participated in this study; 58.18% of the students were male (N= 32) and 41.82% were female (N= 23). 63.63% of the students were in the 7th grade (N= 35), and 36.37% of them were in the 6th grade.

Data Collection and Analysis

In this study, an opinion survey on metaverse and metaverse-based education prepared by researchers was used to collect qualitative data. The survey consisted of two parts. In the first part, there were questions to reach demographic information, while in the second part, open-ended questions were included.

In addition, the adaptation of the "Virtual World Risk Perception Scale" (VWRPS) developed for high school students by Arslankara and Usta (2018) to the secondary school level was used to obtain quantitative data. VWRPS is a valid and reliable five-point Likert scale comprising 26 items and five sub-dimensions. The scale, adapted to the secondary school level, has 23 items. The names of these sub-dimensions are *virtual corruption*,

virtual opportunity, virtual awareness, virtual depreciation, and virtual possibility. The reliability coefficient of the scale was Cronbach's $\alpha = 0.87$

Inductive content analysis of qualitative data was performed. Inductive content analysis is a technique used to reveal the relationships between themes and concepts by examining qualitative data using a coding method. In this process, there are stages, such as coding, creating a theme, establishing a code and theme relationship, and interpreting the findings (Yıldırım and Şimşek, 2016, p. 243).

To increase the validity and reliability of this research, expert opinions were obtained from two informatics and technology teachers for readability and intelligibility. For the same purpose, measures such as data collection and analysis, the criteria for choosing the method used and the adoption of the purposive sampling method, the voluntary participation of students, and direct quotations were taken (Yıldırım & Şimşek, 2016).

In the quantitative data analysis, the assumption of normality was tested first. The normality assumption is the basic statistical assumption required for the application of parametric tests (Thode, 2002). The Kolmogorov-Smirnov values, skewness, and kurtosis coefficients of the obtained data are given in Table 4.

Table 4. Normality tests for scores obtained from the VWRP scale

Scale	\bar{x}	SD	Median	Kolmogorov-Smirnov	Skewness	Kurtosis
VWRP	64.127	9.81	65	.200	.143	-.233

VWRPS: Virtual World Risk Perception Scale

In Table 4, it was seen that the Kolmogorov-Smirnov value for the points students obtained from the VWRP scale was greater than .05 and that the skewness and kurtosis values were in the range of -1 to +1, which showed a normal distribution. In the analysis of the data obtained, it was decided to perform a dependent sample t-test and a one-way analysis of variance (ANOVA). Data collected to determine the risk perception levels of gifted secondary school students regarding the virtual world were analyzed with SPSS 26.00. The significance level was determined as .05.

Results

Findings on Qualitative Data

In this section, themes suitable for the survey questions were created, and codes were assigned to the answers given. Some of the answers were located under more than one code (Table 5).

Table 5. Distribution by Theme and Categories

Theme	Categories
Information about the metaverse	Information type Other
Concept knowledge about the metaverse	Concept
Source of information about the metaverse	Not previously aware Environment Media
Metaverse experience	There is experience There is some experience No experience
Metaverse and education	Education Entertainment Other
Metaverse in education and the development of abilities	Technology The approach to education Personal development Other
Is metaverse-based education superior to traditional education?	Superior I do not know Not superior
Risks of metaverse-based education	Advantages Disadvantages

Table 6. Findings related to students' knowledge about the metaverse

Categories	Code	Participant code	N	Sample expressions
Information type	Virtual world/universe	S5, S15, S18, S19, S29, S31, S34, S40, S41, S46, S48, S50, S54, S55	14	<i>S55: The metaverse is a universe in the virtual world.</i>
	Virtual Reality	S6, S8, S9, S11, S14, S23, S25, S35, S37, S39, S49, S53	12	<i>S35: I know there is an online virtual reality platform.</i>
	Crypto	S3, S7, S17, S30, S47, S52	6	<i>S52: NFTs is a platform where you can buy plots or items with virtual coins of our characters that others can see.</i>
	Existing program to socialize or meet with an avatar	S16, S42, S43, S45	4	<i>S42: In a virtual universe, we can edit our avatar and access or share content, such as entertainment, business, or advertising.</i>
	The new technological world	S13, S26, S28	3	<i>S28: The technology world was created with artificial intelligence.</i>
Other	No idea	S1, S2, S4, S10, S12, S20, S21, S22, S24, S27, S32, S33, S36, S38, S44, S51	16	

In Table 6, the categories and codes for the students' opinions under the theme of "metaverse knowledge" are given. While 16 of the students stated that they did not have any knowledge about the metaverse, it was seen that 39 students have different types of knowledge about the metaverse. When the information about the metaverse was examined, it was seen that 14 students define the virtual world/universe, 12 students define virtual reality, six students define crypto money and trading, four students define the metaverse platform as a place where avatars are created and socialized, meetings are held, and three students describe it as the new technological world

Table 7. Findings related to students' conceptual knowledge about the metaverse

Categories	Code	N	%
Concept	AR-Augmented Reality	34	61,8
	XR-Extended reality	8	14,5
	NFT-Non-fungible token	25	45,5
	VR-Virtual Reality	51	92,7
	3D- Three-dimensional	52	94,5
	Blockchain	11	20
	Crypto	36	65,5
	Horizon Worlds	5	9,1

In Table 7, the answers given to the students who were asked to choose whether they knew the concepts related to the metaverse were examined. While almost all of the students stated that 94.5% knew the concept of 3D-three dimensions (N= 52) and 92.7% (N= 51) of VR-virtual reality, the least known concepts were Horizon Worlds 9.1% (N= 5) and XR-extended reality 14.5% (N= 8).

Table 8. Findings on the source of students' knowledge about the metaverse

Categories	Code	N
Other	No idea	4
Environment	Family	10
	Friends	16
	School	5
Media	Social media	38
	TV	26

Table 8 shows the students' statements about the sources from which they obtained information about the metaverse. There were expressions that entered more than one code in the students' answers. It was observed that most answers obtained information about the metaverse using social media (N= 38). It was seen that the place where the source of information about the metaverse was the least was school (N=5). Under the other theme, it was seen that four students stated that they had no knowledge of the metaverse before.

Table 9. Findings on students' metaverse experiences

Categories	Code	Participant code	N	Sample expressions
No experience	There is no experience	S1, S2, S6, S9, S10, S11, S12, S13, S15, S17, S19, S20, S21, S22, S23, S24, S25, S29, S30, S32, S33, S34, S35, S36, S37, S39, S40, S41, S43, S44, S45, S48, S49, S51, S53	35	<i>S35: In general, I have never been to an online virtual reality platform.</i>
There is experience	There is some experience	S4, S14, S31, S42	4	<i>S14: I tried to do some things, but without success.</i>
	Crypto	S3, S7	2	<i>S7: I created a crypto wallet and made a game on the site called Sandbox (1 Ethereum coin per hour for 100 active players), and I got 1.24 Ethereum coins. I bought NFT with it.</i>
	VR-Virtual glasses experience	S5, S28, S38, S54, S55	5	<i>S55: I used virtual reality glasses.</i>
	Entertainment-Chat	S16, S18	2	<i>S16: I played VRCHAT.</i>
	Entertainment-Game	S8, S26, S27, S46, S47, S50, S52	7	<i>S46: If its experience as a metaverse counts, there is Roblox. I've been playing games about the metaverse for a while.</i>

In Table 9, there are answers about the students' experiences with the metaverse. Thirty-five of the students stated that they did not have any experience, and 23 of the students stated that they had metaverse experience. Under the category of "Have Experience" it was seen that the students had the most experience with the game (N=7). It was stated that five of the students had experience with virtual glasses, two with crypto money, and two with chatting.

Table 10. Findings related to students' views on the metaverse and education

Categories	Code	Participant code	N	Sample expressions
Education	Training with virtual reality glasses	S5, S9, S37, S39, S48	5	<i>S37: For example, teachers will ask you questions and teach you virtually. You can see with virtual reality glasses, ask questions, and take lessons in virtual reality with avatars of famous scientists.</i>
	Education augmented reality	S7, S8, S17, S23, S34, S35, S42	7	<i>S35: Schools are digitally real in the metaverse. And, in this way, students with certain ailments are prevented from falling behind in education. Just like on the Zoom platform, when everyone turns their heads, they will see and maybe touch each other.</i>
	Virtual class	S3, S6, S11, S14, S15, S16, S17, S19, S25, S29, S30, S31, S32, S35, S36, S42, S45, S53, S55	19	<i>S31: Virtual education opportunity</i>
Entertainment	Playing games	S17, S18, S25, S26, S54	5	<i>S18: Minecraft education, Roblox Studio and Sandbox come to mind.</i>
Other	Education-oriented answers only	S1, S4, S10, S12, S13, S24, S27, S40, S41, S43, S50	11	<i>S40: Internet training</i>
	Crypto	S2, S3, S54	3	<i>S2: Virtual currencies, such as bitcoin.</i>
	No idea	S20, S21, S22, S28, S33, S38, S44, S46, S47, S49, S51, S52	12	

Table 10: Students' ideas about the metaverse and education, education, entertainment, and other categories are discussed. In the education category, the answers of 19 students were given under the virtual classroom, seven students were given augmented reality education, and five students were given the education code with virtual reality glasses. The opinions of five students fell under the categories of entertainment and playing games. In the last category, under the other heading, 12 people did not have an opinion, 11 people gave only education-oriented answers, and the opinions of three students were included under the crypto code.

Table 11. Findings regarding the effects of metaverse use in education on ability development

Categories	Code	Participant code	N	Sample expressions
Technology	Use of computers	S1, S8, S13, S14, S15, S19, S41, S46	8	<i>S41: Uses technological devices more easily. Can make new devices</i>
	Software	S3, S6, S16, S19, S24, S32, S36	7	<i>S6: Adaptation to virtual reality, software knowledge.</i>
	Virtual reality/ learning in a digital environment	S2, S6, S9, S11, S31, S55	6	<i>S2: It can better enhance the virtual environment.</i>
Personal development	Self-expression	S4, S35, S47	3	<i>S35: On this platform, if there are social areas and workshops, students can participate in the activities here.</i>
	Visual perception and creativity	S3, S5, S17, S28, S48, S49, S50, S54	8	<i>S48: There can be a great improvement in creativity.</i>

	Virtual Experience	S7, S10, S13, S16, S17, S35	6	<i>S7: It allows a medical student to experience surgeries virtually, and this gives experience.</i>
The approach to education	Love for education	S26, S27, S29, S40, S45	5	<i>S26: Most likely, a lot of students would start to like the course or school because the metaverse is a separate world, and a lot of my peers, including myself, like technology, so they would like education more.</i>
Other	No idea	S12, S18, S20, S21, S22, S23, S25, S30, S33, S34, S37, S38, S39, S42, S43, S44, S51, S52, S53	19	

In Table 11, the answers about which skills can be developed with the use of the metaverse are technology, personal development, approach to education, and other categories. In the answers given under the technology category, the students' opinions were gathered under the codes of computer use (N= 8), software (N= 7), virtual reality, and learning in a digital environment (N= 6). Under the personal development category, students' opinions were included under the codes of self-expression (N= 3), visual perception and creativity (N= 8) and virtual experience (N= 6). Under the category of approach to education, the code of love for education was included (N= 5). In the other category, opinions were given with the code "I have no idea" (N= 19).

Table 12. Opinions on the comparison of metaverse-based education and traditional education

Categories	Code	Participant code	N	Sample expressions
Superior	Entertaining	S3, S16, S17, S18	4	<i>S16: Yes, there is no need to buy a book; it can be continued even if there are health problems. It would be a more fun and motivating system for students. Lessons would be easier to understand.</i>
	No reason	S10, S20, S34, S42	4	<i>S10: It is superior, but the reason is uncertain.</i>
	Learning becomes easier because of an interest in technology	S6, S13, S15, S24, S26, S40, S41, S48	8	<i>S24: It is superior because it will benefit present and future generations as it is closer to artificial intelligence.</i>
	It is not limited or compelling.	S1, S3, S5, S16, S27, S28, S31	7	<i>S3: In my opinion, education is superior to the metaverse. Because the lessons will be more fun for the children as they are processed on the computer. The metaverse is not limited like a book.</i>
	Virtual experience opportunity	S7, S46	2	<i>S7: The metaverse is superior, in my opinion. Students can benefit from the opportunity to experience it in a virtual environment.</i>
	It prevents the spread of diseases	S14, S17	2	<i>S14: Yes. Because it is not done in a public area, it prevents negativity, such as infectious diseases.</i>
Not superior	Lack of face-to-face interaction	S4, S19, S36	3	<i>S4: No, it's not superior. Because it is more important for children to explain themselves to the other person.</i>
	Traditional education is more effective	S9, S29, S30, S33, S35, S38, S39, S43, S45, S50, S53, S54	12	<i>S45: I think not. Because school is more useful.</i>

	Cause health problems	S8, S23, S32, S55	4	<i>S8: No. 1st graders from Teams or Zoom couldn't even learn how to write, so overall, it's bad. Affects many people, such as impaired eyesight or an inability to learn.</i>
	Failure of students to adapt	S11, S25, S47, S49	4	<i>S49: No because it can be more expensive; not everyone has the metaverse.</i>
	Equal value	S2, S21	2	<i>S2: Equal</i>
Other	No idea	S12, S22, S37, S44, S51, S52	6	

The answers of the students about whether metaverse-based education was superior to traditional education are presented in Table 12. To the answers given under the category of "superior," easy learning (N= 8), not limited and challenging (N= 7), entertaining (N= 4), no reason (N= 4), virtual experience opportunity (N= 2), and disease prevention (N= 2) codes were located below. The answers given under the "not superior" category were that traditional education is more effective (N= 12), there is no face-to-face interaction (N= 3), it causes health problems (N= 4), students' inability to adapt (N= 4), and it has equal value. It was coded as (N= 2). The answers of six students were given under the code "I have no idea."

Table 13. Student views on the advantages of metaverse-based education

Categories	Code	Participant code	N	Sample expressions
Experience and learning	It contributes to education/provide s motivation	S1, S5, S8, S17, S26, S34, S36, S37, S40, S42	10	<i>S5: People will understand more clearly because they see something more concrete.</i>
	Virtual Experience	S3, S6, S7, S10, S11, S25, S32, S35, S39, S48	10	<i>S6: Students learn more about VR.</i>
	Contribution to personal and professional development	S4, S13, S24, S34	4	<i>S4: Students learn to express themselves.</i>
	Entertaining learning experience	S28, S36, S40, S43	4	<i>S40: Children learn more with pleasure.</i>
Access	Convenient and easy access to information	S7, S9, S14, S27, S28, S29, S31, S35, S39, S42, S45, S47, S48, S53, S54, S55	16	<i>S7: The strength of this training is that it will be as close as a spectacle. It will enable us to gain experience by experiencing a situation virtually.</i>
	Less cost	S4, S15, S16, S45	4	<i>S45: Students whose school is far away and do not have a car or cannot go by bus can easily receive an education.</i>
Productivity	Being productive	S34, S41, S54	3	<i>S34: Provides the opportunity to learn languages. It allows users to create their own content.</i>
Other	No idea	S2, S12, S18, S19, S20, S21, S22, S23, S33, S44, S46, S49, S50, S51, S52	15	
	No advantage	S30, S38	2	

Table 13 presents the answers of the students regarding the advantages of metaverse-based education. . The theme of the advantages of metaverse-based education included experience and learning, access, productivity, and other categories. Under the experience and learning category, there were student opinions with the codes of contribution to education and motivation (N= 10), virtual experience (N= 10), contribution to personal and

professional development (N= 4), and entertaining learning experience (N= 4). Under the access category, student answers were included under the codes of convenient and easy access to information (N= 16) and less cost (N= 4). The answers of three students in the productivity category were included under the code of being productive. The answers in the other category are “I have no idea” (N= 15) and “no advantage” (N= 2).

Table 14. Student views on the disadvantages of metaverse-based education

Categories	Code	Participant code	F	Sample expressions
Health issue	Eye and physical illnesses	S3, S4, S8, S9, S15, S19, S26, S30, S34, S42, S54	11	<i>S8: Fatigue from constantly staring at the computer</i>
	Addiction	S3, S10, S27, S30, S32, S54	6	<i>S54: People can be addicted to the metaverse this time, too.</i>
	Inability to focus	S23, S42, S55	3	<i>S42: Just like with Zoom, students may not be able to give their full attention.</i>
Security and ethics	Hackable	S5, S7, S16, S35, S36, S39, S40, S47, S55	9	<i>S7: If there is no blockchain protection in Metaverse, Metaverse can be hacked. Education can be sabotaged.</i>
	Lesson sabotage	S7, S9, S15, S17, S19, S25, S29, S45	8	<i>S25: Since this is a public platform, there will be people other than students; these people can cheat or bully because of their bad intentions because this platform is an international platform, and I don't think teachers can control it.</i>
	Cybercrimes increase	S14, S17, S23, S25, S31, S35, S36	7	<i>S14: Crimes, such as cyberbullying, may increase.</i>
	Students make copies	S16, S47	2	<i>S16: There may be problems, such as cheating in exams. It is more efficient to switch to physical space in exams.</i>
Educational difficulties	Difficulty of traditional education	S6, S10, S16, S27, S29, S37, S53	7	<i>S6: It may be difficult to do things in traditional ways as they may spend time with too much technology.</i>
In terms of social-emotional	Disconnected from real life	S6, S11, S37, S41, S48	5	<i>S6: Individuals can be cut off from real life.</i>
	Solitude and socialization problem	S4, S31, S36, S41, S50, S54	6	<i>S41: In these periods, we already spend most of our time on the internet; if education is like this, our human relations and our connection with real life can be broken.</i>
Other	There is no disadvantage	S1, S2, S13, S18, S28, S43, S46	7	<i>S2: There is no</i>
	No idea	S12, S20, S21, S22, S24, S33, S38, S44, S49, S51, S52	11	

In Table 14, students' views on the disadvantages of the metaverse-based education environment are given. Under the category of health issues, eye and physical health illnesses (N= 11), addiction (N= 6), inability to focus (N= 3) codes and student opinions were present. Under the category of security and ethical, hackable (N= 9), lesson sabotage (N= 8), cybercrime increase (N= 7), and students make copies (N= 2) opinions were provided. Under the category of educational difficulties, the difficulty of traditional education (N= 7) was expressed. The views under the category of social-emotional problems were disconnection from real life (N= 5) and socialization problem-solitude (N= 6). Under the other category, there was no disadvantage (N= 7) and an “I have no idea” (N= 11) code.

Findings on Quantitative Data

The descriptive analysis of the scores of the students participating in the present study on the VWRP scale and its sub-dimensions is given in Table 15.

Table 15. Descriptive analysis results of the study group regarding the distribution of VWRP scale and sub-dimensions

	N	\bar{x}	SD
VWRP	55	64.127	9.81
Virtual depreciation	55	9.56	4.12
Virtual corruption	55	13.41	4.46
Virtual possibility	55	9.76	3.11
Virtual awareness	55	14.29	2.48
Virtual opportunity	55	17.09	2.50

As shown in Table 15, the average scores obtained from the Virtual World Risk Perception scale of the students were $\bar{x}= 64.12$ and the standard deviation $SD= 9.81$. The mean and standard deviation values according to the sub-dimensions of the scale were: virtual depreciation $\bar{x}= 9.56$ $SD= 4.12$; virtual corruption $\bar{x}= 13.41$ $SD= 4.46$; virtual possibility $\bar{x}= 9.76$ $SD= 3.11$; virtual awareness $\bar{x}= 14.29$ $SD= 2.48$; and virtual opportunity $\bar{x}= 17.09$ $SD= 2.50$.

Table 16. T-test results of the VWRP scale and sub-dimension scores by gender of the study group

	Variables	N	\bar{x}	SD	df	t	p
VWRP	Female	23	61.52	4.88	53	-1.698	.095
	Male	32	66.00	4.21			
Virtual depreciation	Female	23	9.73	4.75	53	.265	.792
	Male	32	9.43	3.68			
Virtual corruption	Female	23	13.39	4.88	53	-.037	.970
	Male	32	13.43	4.21			
Virtual possibility	Female	23	8.69	3.09	53	-2.234	.030*
	Male	32	10.53	2.94			
Virtual awareness	Female	23	13.17	2.56	53	-3.034	.004*
	Male	32	15.09	2.11			
Virtual opportunity	Female	23	16.52	2.19	53	-1.443	.155
	Male	32	17.50	2.66			

To analyze the difference between the virtual world risk perceptions and sub-dimension scores of male and female students included in this study in Table 16, an independent sample t-test was conducted. According to the analysis results, while there was no significant difference between the virtual world risk perception total score and virtual depreciation, virtual corruption, and virtual opportunity sub-dimension scores of female and male students ($p>.05$, Table 13), there was a significant difference in virtual possibility and virtual awareness scores according to gender ($p<.05$, Table 13). When the virtual possibility scores of female students ($\bar{x}_{\text{female}}= 8.69$) compared to those of male students ($\bar{x}_{\text{male}}= 10.53$), it was also seen that the virtual awareness scores of female students ($\bar{x}_{\text{female}}= 13.17$) were lower than those of male students ($\bar{x}_{\text{male}}= 15.09$).

Table 17. T-test results of VWRP scale scores by 6th and 7th grade students in the study group

	Variables	N	\bar{x}	SD	df	t	p
VWRP	6th grade	20	67.00	9.23	53	1.667	.101
	7th grade	35	62.48	9.88			

As shown in Table 17, an independent sample t-test was conducted to analyze the difference between the 6th and 7th-grade students' virtual world risk perception scores. No significant difference was found in the virtual world risk perception of 6th and 7th grade students ($p>.05$, Table 17).

ANOVA results, which were conducted to determine whether students' risk perceptions differ significantly according to their metaverse experiences, are given in Table 18 below.

Table 18. ANOVA results of VWRP scale scores according to the metaverse experience of the study group

	Variance Source	Sum of Squares	df	Mean of squares	F	p	Significant difference
VWRP	between groups	473.00	2	236.500	1.720	.189	
	within groups	7287.839	53	137.506			
	Total	7760.839	55				
Virtual depreciation	between groups	49.347	2	24.673	1.478	.238	
	within groups	868,180	52	16,696			
	Total	917,527	54				
Virtual corruption	between groups	157.5	2	78.772	4.453	.016*	No experience > There is experience
	within groups	919.83	52	17.689			
	Total	1077.382	54				
Virtual possibility	between groups	23,60	2	11,803	1,227	,302	
	within groups	500,32	52	9,622			
	Total	523,927	54				
Virtual awareness	between groups	33.37	2	16.68	2.893	.064	
	within groups	299.97	52	5.76			
	Total	333.345	54				
Virtual opportunity	between groups	.065	2	.033	.005	.995	
	within groups	338.480	52	6.509			
	Total	338.545	54				

*p<.05

As can be seen in Table 18, the result of the ANOVA analysis did not show a significant difference in students' risk perceptions according to their metaverse experiences. ($F= 1.720$, $p>.05$). The students' virtual corruption sub-dimension scores differed significantly according to their metaverse experiences ($F= 4.453$, $p<.05$). According to the results of the LCD post hoc multiple comparison analysis, it was seen that the virtual corruption mean score of the students without metaverse experience ($\bar{x}_{\text{noexperienced}}= 14.60$) was statistically significantly higher than the virtual corruption mean score of the students with experience ($\bar{x}_{\text{experienced}}= 10.81$).

Discussion, Conclusion and Recommendations

In this study, the views and perceptions of virtual risk regarding the use of the metaverse in the education of gifted individuals were discussed. The data collected from the students was analyzed, and the results were given in light of the findings.

In the present research, firstly, the following question was asked: "What do you know about the Metaverse?" Most of the students stated that they did not know about the metaverse. Other students defined the metaverse as a virtual universe, virtual reality, crypto money, creating avatars and making meetings, and the new technological world. Similar statements are also included in the literature on the metaverse. Schlemmer and Backes (2015) expressed the metaverse environment as the place where interaction and communication are provided with the use of avatars in the 3D virtual world. In some studies, it is stated that students create avatars for communication, identify crypto money with metaverse platforms (Özdemir et al., 2022), and use virtual money on virtual platforms (Tili et al., 2022).

Secondly, students were asked to express their knowledge of the concepts related to the metaverse. The findings showed that the students who said that they did not know about the metaverse in the previous question actually had knowledge about many concepts related to the metaverse. In particular, it was concluded that almost all of the students had knowledge about the concepts of virtual reality and its three dimensions. In studies, metaverse technology is defined as an environment where the concepts of the virtual world and augmented reality come together (Tili et al., 2022). In addition, although the concept of the metaverse is just entering our lives, it is evident that most of the students are familiar with many concepts related to this platform.

“What is the source of information about the Metaverse?” In the answers to this question, it was seen that most students had knowledge about the metaverse through the media (e.g., TV and social media), and the number of students who met the metaverse through school is less. While the use of the metaverse in education is expected, it is not known to what extent schools and teachers are ready to dominate this process. The findings obtained in this study suggest that students can adopt this platform, which they experience with their own efforts and curiosity, as a new-generation education environment. Diaz (2020) is of the opinion that the use of the metaverse will provide an interesting and effective platform for students and teachers.

When the students' views on their experiences with the metaverse are examined, it is seen that most of them have no experience. This result is consistent with the result of the study conducted by Talan and Kalınkara (2022), which found that the majority of university students do not have metaverse experience. The fact that most students do not have sufficient experience is thought to be because this field is still developing. It has been concluded that students with experience generally have experience with games, chatting, virtual glasses, and crypto money. It is thought that the first contact with gifted students for entertainment will have an impact on their perceptions of metaverse-based education.

The expressions that come to mind when students talk about the metaverse and education are virtual classrooms, education in augmented reality, and education in virtual reality. According to Tsai (2022), teachers and students evaluate the metaverse only as a virtual classroom, augmented reality, and virtual reality, and this evaluation will lead to limited use of universe creativity. Some students stated that it would consist of educational games. Getchell et al. (2010) also discussed that the metaverse environment is an opportunity for game-based learning. Scientific metaverse applications can be included in the institutions where gifted students receive an education. In addition, it can be suggested that other components of the metaverse should be included in training programs to gain an immersive experience.

“Which skills does the use of the metaverse in education improve in students?” The answers to the question were computer usage, software knowledge, adaptation to virtual reality and the digital environment, obtaining virtual experience, self-expression, visual perception and creativity, personal development, and having a positive approach to education.

Students think that metaverse-based education is superior to traditional education because it is more entertaining, not limited and challenging, provides a virtual experience, and prevents infectious diseases. Some students consider traditional education superior due to the lack of face-to-face interaction in the metaverse, health problems (e.g., sight, obesity, and addiction), and students' inability to adapt to the metaverse environment. In the study conducted by Potts (2019), gifted students stated that the difference between traditional education and the virtual classroom is very small.

Students expressed the advantages of metaverse-based education as follows: contributing to education, increasing motivation, obtaining virtual experience, contributing to personal and professional development, having an enjoyable learning experience, having comfortable and easy access to information, having less cost, and contributing to the productivity of students. In the literature, the use of the metaverse is recommended to increase student motivation (Jeon & Jung, 2021), and it is emphasized that education, especially with the metaverse, will provide easy access to individuals without time, space, or financial restrictions (Tili et al., 2022). In the Talan and Kalınkara (2022) study, there are similar statements regarding university students' views on the advantages of a metaverse in education.

The opinions of gifted students on the disadvantages of using the metaverse in education are as follows: health problems (eye diseases due to prolonged screen exposure, obesity or physical diseases, increased addictions, problems with attention and focus), security and ethics (hackability, sabotage of the lesson, increase in cybercrime and making copies of students), difficulty in traditional education, and social-emotional problems (disconnection of students from real life, socialization problem, feeling of loneliness). In the study conducted by Potts (2019), gifted students stated that their virtual classroom experiences limited interaction with both their classmates and teachers. In another study addressing similar disadvantages, university students stated that in addition to these disadvantages, there was also the problem of access and the inability to convey their thoughts correctly (Talan & Kalınkara, 2022).

To prevent these disadvantages and threats, the metaverse education platforms should be structured before they are put into practice, and the rules of the new universe should be created by considering the benefit and value of the participants. Professional development of teachers and all education stakeholders regarding the metaverse universe should be ensured before implementation in the education process.

The "virtual possibility" and "virtual awareness" sub-dimensions of gifted students show significant differences according to gender. According to this result, it is understood that female students have less "possibility" and awareness of the virtual environment. It shows that male students can benefit from the opportunities of virtual environments more than female students. In the study of Dönmez and Doğan (2020), it is stated that male students have higher perceptions of virtual opportunities than females. It was concluded that the risk perceptions of the students did not show a significant difference according to the grade level. This is thought to be because the age groups of the students are very close to each other.

It was concluded that the "virtual corruption" risk perceptions of gifted students differ significantly according to their experience of the metaverse environment. It is understood that the risk perceptions of "virtual corruption" are higher in the students who do not have metaverse experience compared to the students with experience. This means that students with experience with the metaverse universe perceive the risks, such as being deceived in the virtual environment and communicating with people they do not know.

On the metaverse platform, it is crucial to recognize the risks and identify the threats beforehand. Therefore, policymakers, educators, parents, and children should take precautions and offer forward-looking solutions.

Acknowledgements or Notes

About the authors; Kübra Yiğit Tekel, Ph.D Student, Istanbul University-Cerrahpasa, Institute of Graduate Studies, Program in Education of Gifted Education. Yavuz Yaman, Istanbul University-Cerrahpasa, Hasan Ali Yücel Faculty of Education, Department of Special Education. The authors received no grant support from any institution or organization in the study. The authors thank to the participant students, school administration in the study for their active contribution and participation.

Author (s) Contribution Rate

The authors contributed equally to the article.

Conflicts of Interest

There are no conflicts of interest regarding the publication of this paper.

Ethical Approval

Ethical permission 03.01.2023-E-74555795-050.01.04-587947 was obtained from the Social and Humanities Sciences Research Ethics Committee at Istanbul University-Cerrahpasa for this research.

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