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Nursing Students' Perceptions of the Metaverse in Nursing Education and Associated Factors: A Cross-Sectional Study

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Abstract

Aim: Rapid advancements in digital technologies have catalyzed interest in using immersive environments, such as the metaverse, in health professions education. However, empirical evidence regarding nursing students' perceptions of the metaverse and the factors associated with these perceptions remains limited. This study aimed to determine nursing students' perceptions of the metaverse in nursing education and to examine the factors associated with these perceptions.

Methods: This cross-sectional descriptive study was conducted between October and December 2025 with 715 first-, second-, third-, and fourth-year undergraduate nursing students enrolled in a university nursing department. Data were collected online using a sociodemographic information form and the Nursing Students' Metaverse Perception Scale. Descriptive statistics, independent samples t-test, one-way ANOVA, Mann–Whitney U test, Kruskal–Wallis test, and Pearson correlation analysis were used. Statistical significance was set at $p < 0.05$.

Results: The mean total score of the Metaverse Perception Scale was 83.16 ±10.20, indicating that students' perceptions were above average. The highest scores were observed in the "Education" subdimension, while the lowest scores were in the "Challenges" subdimension. Metaverse perception scores were significantly higher among students who had prior knowledge of the metaverse, previous experience with virtual reality or metaverse-related applications, and those who engaged in computer gaming ($p < 0.05$). Additionally, significant correlations were identified between metaverse perception scores and academic year, maternal education level, number of siblings, daily internet usage, and living arrangements.

Conclusion: Nursing students generally maintain a positive perception of the metaverse, with a particular emphasis on its educational potential. Familiarity with digital technologies and prior immersive experiences appear to be associated with more positive perceptions. Integrating metaverse-based applications into nursing curricula may support innovative and experiential learning approaches. These findings underscore the importance of planning metaverse-oriented learning environments within nursing education through a pedagogically sound and student-centered framework.

Keywords: Digital learning, nursing education, nursing students, metaverse.

Highlights

- Nursing students' metaverse perception is above the average level.
- Prior digital experience and awareness are associated with more positive metaverse perceptions.
- Students view the metaverse as a high-potential tool for education.

Introduction

Nursing education aims to develop students' cognitive, psychomotor, and affective competencies and to prepare them for safe and competent professional practice (World Health Organization, 2016). In this context, simulation-based learning has long been used in nursing education to support students' knowledge, clinical skills, and self-confidence in a safe learning environment (Cant & Cooper, 2010). Rapid advancements in digital technologies have further transformed pedagogical practices within the health sciences, with a particularly profound impact on nursing education. Technology-enhanced learning (TEL) is currently integrated through various modalities, including online platforms, mobile applications, blended learning, virtual reality (VR), and digital simulations (O'Connor et al., 2022). Extant literature suggests that VR and virtual simulation applications yield positive effects on critical learning outcomes, such as knowledge acquisition and clinical reasoning, among nursing students (Chen et al., 2020; Sim et al., 2022). More recently, virtual simulation and other technology-supported learning approaches have expanded opportunities for interactive, flexible, and safe clinical learning experiences in nursing education (Foronda et al., 2020). Consequently, immersive simulation environments have gained prominence in nursing and midwifery curricula as essential tools for experiential learning (Ben Yahya et al., 2024).

In recent years, the "metaverse" has emerged as a sophisticated extension of these digital paradigms. Defined as a network of immersive, persistent virtual environments that overlap with the physical world through avatar-based interaction, the metaverse offers an advanced framework for health education (Weinberger, 2022). Recent systematic reviews indicate that metaverse-based learning serves as an innovative instructional domain capable of bridging the gap between theoretical knowledge and clinical practice (Ibrahim et al., 2026). Nursing education is traditionally structured to synthesize theoretical instruction with clinical practice to cultivate cognitive, psychomotor, and affective competencies (WHO, 2016; Yildirim & Sahin, 2025). However, systemic challenges—such as the scarcity of clinical placements, burgeoning student populations, and stringent patient safety protocols—have intensified the demand for flexible, innovative pedagogical approaches (Akyüz & Ergöl, 2022; Durham & Alden, 2008). Evidence suggests that immersive virtual environments mitigate these constraints by providing safe, reproducible, and learner-centered experiences (Foronda et al., 2021; Labrague et al., 2021).

Perception plays a pivotal role in the adoption and effective utilization of such innovative educational technologies. While positive perceptions bolster student engagement and motivation, perceived barriers—such as technological complexity or lack of institutional support—can detrimentally affect this transition (Kardong-Edgren et al., 2022). Although the potential of the metaverse is increasingly debated, empirical evidence directly investigating nursing students' perceptions and the variables associated with these constructs remains limited. Current research is largely characterized by conceptual discussions or small-scale, single-center designs (De Gagne et al., 2023; Ibrahim et al., 2026).

Departing from previous scholarship that primarily centers on conceptual or theoretical frameworks, this study offers empirical evidence from a substantial sample regarding nursing students' perceptions of the metaverse and the factors associated with these perceptions. It is anticipated that findings derived from this broad sample will contribute to the nursing education literature and support the evidence-informed integration of metaverse-based approaches into nursing curricula. In this context, the present study aimed to determine

nursing students' perceptions of the metaverse and to examine the individual and technological factors associated with these perceptions.

1. Methods

1.1. Study Design

This study employed a cross-sectional, descriptive research design to evaluate nursing students' perceptions of the metaverse in nursing education and to identify the demographic and technological factors associated with these perceptions.

1.2. Participants and Setting

The study population consisted of first-, second-, third-, and fourth-year undergraduate nursing students enrolled in the nursing department of a university during the study period. Data were collected between October and December 2025. Eligible participants were students who were enrolled in the department during the study period and agreed to participate voluntarily. Students who did not provide consent or submitted incomplete questionnaires were excluded from the final analysis. A convenience sampling approach was used, and all eligible students were invited to participate through the same communication channels. No formal sample size calculation was performed; instead, the study aimed to reach the entire accessible population during the data collection period. As a result, 715 students with complete responses were included in the final analysis. Because a non-probability sampling method was used, the findings should be interpreted within the limits of the participating sample.

1.3. Data Collection Instruments

Sociodemographic Information Form: Developed by the researchers, this form collected data on participants' demographic and technological characteristics, including age, gender, year of study, marital status, parental education and occupation, number of siblings, living arrangements, daily internet use, preferred learning methods, and prior exposure to virtual reality, computer gaming, and the metaverse.

Nursing Students' Metaverse Perception Scale: The scale, developed by Yıldırım and Karaman (2024), was used to assess nursing students' perceptions of the metaverse. It consists of 24 items and four subdimensions: Education (Items 1–9), Technology (Items 10–14), Challenges (Items 15–19), and Lifestyle (Items 20–24). The scale is a 5-point Likert-type instrument ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicate a more positive perception of the metaverse. Reverse coding was applied to the items in the Challenges subdimension in accordance with the original scoring procedure. The original scale demonstrated high reliability, with a Cronbach's alpha of 0.955 for the total scale and values ranging from 0.930 to 0.955 for the subdimensions. Permission to use the scale was obtained from the scale developers.

1.4. Data Collection

Data were collected online from nursing students who met the inclusion criteria and agreed to participate in the study. An information sheet describing the aim and procedures of the study was presented on the first page of the online survey, and informed consent was obtained electronically through a voluntary participation button before access to the questionnaire was

granted. After face-to-face information was provided to students, the survey link was shared through the social media platforms used by each class for communication. Participants completed the questionnaire using their mobile phones, computers, or tablets. To reduce the likelihood of duplicate submissions, the survey link was configured for single use only. Several measures were taken to reduce potential sources of bias. The survey was administered anonymously, participation was voluntary, all eligible students were invited through the same communication channels, and duplicate submissions and implausibly rapid responses were excluded during data screening. After data collection was completed, all responses were reviewed, and 15 questionnaires were excluded because they were incomplete and/or showed poor response quality, such as identical responses throughout or implausibly short completion times.

1.5. Data Analysis

Statistical analyses were conducted using IBM SPSS Statistics version 22.0. Only complete questionnaires were included in the analysis; therefore, no imputation procedure was applied for missing data. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the data. Prior to inferential analyses, outliers were assessed using z-scores, and none exceeded ±3.00. Normality was evaluated based on skewness and kurtosis values within the range of ±1.96. Independent samples t-tests and one-way ANOVA with Bonferroni post hoc testing were used for normally distributed variables, whereas Mann–Whitney U and Kruskal–Wallis tests were applied for non-normally distributed variables. Pearson correlation analysis was used to examine relationships among scale subdimensions. Statistical significance was set at $p < 0.05$. The analyses focused on unadjusted comparisons and correlation estimates; therefore, adjusted effect estimates and 95% confidence intervals were not calculated. No sensitivity analysis was performed.

1.6. Ethical Considerations

Ethical Approval

Ethical approval for this study was obtained from the Health Sciences Ethics Committee of the Faculty of Medicine, Manisa Celal Bayar University (decision date/no: 27 August 2025; 20.478.486/3366). Institutional permission to conduct the study was also granted by the Dean's Office of the Faculty of Health Sciences, Manisa Celal Bayar University (15 September 2025; E-64031256-299-1094852). Written and verbal information about the study was provided to all participants, and confidentiality and anonymity were ensured throughout the research process. Participation was voluntary, and students were informed of their right to withdraw from the study at any time without penalty.

This manuscript was prepared in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline, and the completed STROBE checklist is provided as a supplementary file.

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3. Results

3.1. Participant Characteristics

A total of 823 students were invited to participate. Of these, 730 responded to the survey, 15 questionnaires were excluded during data screening, and 715 students were included in the final analysis. The number of non-responders was 93. The participants had a mean age of 20.55 ± 2.91 years (range: 17–48). The sample was predominantly female (73.1%) and single (98.6%). Students were distributed across all levels of study: first-year (23.5%), second-year (28.4%), third-year (23.8%), and fourth-year (24.3%). Most students resided in dormitories (72.7%) and used the internet for 0–5 hours daily (67.0%). While 95.9% frequently used smartphones, only 33.7% had previously heard of the metaverse and 17.8% had participated in virtual reality or metaverse-related applications (Table 1).

3.2. Nursing Students' Metaverse Perception Scores

The mean total perception score was 83.16 ±10.20, indicating an above-average perception of the metaverse. The highest mean scores were recorded in the Education (33.29 ±5.48) subdimension, followed by Technology (18.79 ±3.26) and Lifestyle (18.20 ±3.12). The Challenges (12.88 ±3.56) subdimension yielded the lowest mean score (Table 2).

3.3. Correlations Between Scale Subdimensions

Pearson correlation analysis revealed significant inter-relationships among all subdimensions ($p < 0.05$). The Education subdimension exhibited a strong positive correlation with Technology ($r = 0.858$) and a moderate positive correlation with Lifestyle ($r = 0.733$). Conversely, the Challenges subdimension was negatively correlated with all other subdimensions, suggesting that higher perceived barriers correspond to lower perceived benefits in other areas (Table 3).

3.4. Factors Associated with Metaverse Perception

While gender and age were not significantly associated with perception scores ($p > 0.05$), several other variables showed significant associations with metaverse perception scores (Table 4).

- **Academic Level:** Senior students (2nd, 3rd, and 4th years) had significantly higher total and Education subdimension scores than freshmen ($p < 0.05$).

- **Technological Exposure:** Students familiar with the term "metaverse" or those with prior VR experience reported significantly higher overall perception scores and lower perceived challenges ($p < 0.01$).
- **Gaming & Interest:** Students who identified as gamers or those who believed the metaverse is relevant to healthcare demonstrated significantly more positive perceptions ($p < 0.001$).
- **Family & Lifestyle:** Students residing with their families and those with moderate internet use (0–10 hours) showed higher perception scores compared to their peers.

4. Discussion

This study provides important insights into the ongoing digital transformation in nursing education by examining students' perceptions of the metaverse and the factors associated with

these perceptions. The findings indicate that nursing students have an above-average perception of the metaverse, with particularly high scores in the Education subdimension. This pattern suggests that students primarily view the metaverse as a functional and purposeful learning environment rather than merely as a technological novelty.

In recent years, particularly following the rapid digitalization of education and the increasing use of virtual learning tools, virtual simulations and remote learning applications have become more visible in nursing education (Cant et al., 2022; Shorey & Ng, 2021). Within this context, the metaverse has been discussed as an innovative ecosystem that extends beyond conventional virtual reality applications by offering opportunities for experiential learning and for narrowing the gap between theoretical knowledge and clinical practice (Ibrahim et al., 2026). The high scores observed in the Education subdimension in the present study suggest that students perceive this technology as an interactive and student-centered educational tool with the potential to support professional competence development. This finding is consistent with previous literature highlighting the educational value of immersive environments for clinical reasoning, decision-making, and self-efficacy (Chen et al., 2020; Sim et al., 2022).

The relatively lower scores in the Challenges subdimension suggest that students did not report strong resistance or markedly negative attitudes toward this emerging technology. However, this finding may also reflect their limited direct experience with metaverse platforms. Previous studies have shown that concerns related to technological complexity may decrease as users gain more hands-on experience (Liaw et al., 2020). In this respect, the lower challenge perceptions observed among students with prior VR or metaverse-related experience may indicate that technological familiarity is associated with more favorable perceptions of immersive educational tools.

Higher metaverse perception scores among students in upper academic years may be related to their increasing professional and clinical exposure. As students progress through nursing education, they may become more aware of the value of safe and reproducible environments, such as metaverse-based applications, for practicing complex or high-risk scenarios that may be difficult to access in real clinical settings because of patient safety and ethical considerations (Labrague, 2021). Similarly, the more positive perception scores observed among students with gaming experience, prior awareness of the metaverse, and prior VR exposure may suggest that familiarity with digital technologies is associated with greater openness to immersive learning environments. This interpretation is also compatible with technology acceptance literature, particularly with the concepts of perceived usefulness and ease of use (Aloweni et al., 2021).

The associations observed between metaverse perception and certain sociodemographic characteristics, such as maternal education level, place of residence, and daily internet use, suggest that students' perceptions of emerging educational technologies may also be shaped by broader social and educational contexts. These findings underscore the importance of developing inclusive and equitable implementation strategies that take student diversity into account when integrating digital tools into nursing education. In addition, students who perceived the metaverse as relevant to health and education reported higher perception scores, which may suggest that pedagogical alignment is an important component of technology acceptance. When students perceive a clear connection between a technological tool and their educational goals, they may be more likely to engage positively with that tool.

Overall, the findings of this study suggest that the metaverse is viewed positively by nursing students and may represent a promising educational approach in nursing education. However, these findings should be interpreted within the limits of a cross-sectional and descriptive design. For the effective integration of metaverse-based applications into nursing curricula, pedagogical objectives should be clearly defined and students' digital readiness should be supported. Future studies using experimental, longitudinal, and multivariable analytical designs are needed to better clarify the educational role of the metaverse and its relationship with clinical skill development and longer-term learning outcomes.

5. Conclusion and Recommendations

This study indicates that nursing students have an above-average perception of the metaverse, particularly with regard to its educational potential. The findings suggest that students view the metaverse as a promising learning environment in nursing education and that technological awareness and prior experience are associated with more positive perceptions. In particular, the higher perception scores observed among students with previous exposure to virtual reality or metaverse-related applications may indicate the importance of experience-based learning in supporting technological acceptance.

The findings also suggest that the metaverse may serve as an innovative instructional tool to support experiential learning, student-centered pedagogy, and clinical readiness. However, the observed associations between metaverse perception and prior digital familiarity indicate that the educational value of such technologies may depend on how carefully they are integrated into the curriculum. Accordingly, metaverse-based learning environments should be developed within clearly defined pedagogical frameworks.

Based on these findings, the following recommendations are proposed:

- **Structured Integration:** Nursing curricula may benefit from the strategic incorporation of the metaverse and similar immersive technologies to support simulation-based education and clinical skill development.
- **Digital Readiness:** Orientation programs and digital literacy training should be considered to improve students' readiness for metaverse-based learning environments.
- **Content Development:** The design of metaverse applications should prioritize learning outcomes, student safety, and ethical principles.
- **Faculty Development:** In-service training programs may help educators effectively facilitate teaching and learning in emerging digital environments.
- **Future Research:** Further studies using experimental, longitudinal, and multivariable analytical designs are needed to better clarify the educational role of the metaverse and its relationship with academic achievement, clinical competency, decision-making, and long-term learning outcomes.

In conclusion, the metaverse appears to hold promise as an educational approach in nursing education when supported by sound pedagogical planning and adequate technological infrastructure. The findings of this study may provide a useful foundation for future research and for the careful integration of metaverse-based applications into nursing curricula.

Limitations

Despite its contributions, this study has several limitations. First, its cross-sectional design precludes causal inferences. Second, because the data were collected using self-reported

questionnaires, the findings may have been influenced by social desirability bias. Third, the study was conducted at a single center, which may limit the generalizability of the findings. In addition, the use of convenience sampling may have introduced selection bias. Therefore, the results should be interpreted with caution when considering their transferability to other institutions or student populations.

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CRediT authorship contribution statement

- **Ç.G.Ö**. : Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization, Project administration, Supervision**.**
- **G.S. :** Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – review & editing**.**
- **M.A.:** Methodology, Investigation, Formal analysis, Data curation, Writing – review & editing.

Declaration of competing interest
The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) to improve language and readability. The authors reviewed and edited the output as appropriate and take(s) full responsibility for the content of the publication.

Table 1. Findings regarding the characteristics of the nursing students included in the study (n=715)

Variable	n (%)
Gender	
Female	523 (73.1)
Male	192 (26.9)
Age group	
≤18 years	94 (13.1)
19–20 years	307 (42.9)
21–22 years	250 (35.0)
≥23 years	64 (9.0)
Age, mean ± SD	20.55 ± 2.91
Age, min–max	17–48
Year of study	
First year	168 (23.5)
Second year	203 (28.4)
Third year	170 (23.8)
Fourth year	174 (24.3)
Marital status	
Married	10 (1.4)
Single	705 (98.6)
Type of high school graduated	
Regular high school	20 (2.8)
Private high school	30 (4.2)
Anatolian high school	578 (80.8)
Science high school	69 (9.7)
Vocational high school	18 (2.5)
Mother's educational status	
Illiterate	48 (6.7)
Primary school	302 (42.2)
Middle school	143 (20.0)
High school	150 (21.0)
University	72 (10.1)
Mother's occupation	
Homemaker	562 (78.6)
Civil servant	42 (5.9)
Worker	74 (10.3)
Tradesperson	19 (2.7)
Retired	13 (1.8)
Farmer	3 (0.4)
Father's educational status	

Variable	n (%)
Illiterate	9 (1.3)
Primary school	182 (25.5)
Middle school	166 (23.2)
High school	217 (30.3)
University	141 (19.7)
Father's occupation	
Civil servant	103 (14.4)
Retired	275 (38.5)
Other	337 (47.1)
Number of siblings	
None	22 (3.1)
One sibling	274 (38.3)
Two siblings	224 (31.3)
Three siblings	88 (12.3)
Four or more siblings	107 (15.0)
Current place of residence	
State dormitory	520 (72.7)
Family home	116 (16.2)
Private dormitory	55 (7.7)
Own home	24 (3.4)
Daily time spent on the internet	
0–5 h	479 (67.0)
6–10 h	216 (30.2)
10–15 h	20 (2.8)
Most frequently used technological device	
Phone	686 (95.9)
Computer	16 (2.2)
Tablet	13 (1.8)
Heard of the metaverse before	
Yes	241 (33.7)
No	474 (66.3)
If yes, what they know about the metaverse	
Virtual world	154 (21.5)
Artificial intelligence	18 (2.5)
Three-dimensional form of the internet	5 (0.7)
A platform offering entertainment and interaction	1 (0.1)
Do not know	537 (75.1)
If no, what they think the metaverse is	
Virtual universe	56 (7.8)
Related to the internet	37 (5.2)
Related to artificial intelligence	32 (4.5)
Something technological	32 (4.5)
Related to medicine/education	21 (2.9)

Variable	n (%)
Digital	6 (0.8)
Related to psychology	2 (0.3)
Informatics	11 (1.5)
Do not know	517 (72.4)
Best learning method	
Writing	247 (34.5)
Reading	74 (10.3)
Seeing	109 (15.2)
Practicing	285 (39.9)
Perception that the metaverse is related to health and education	
Yes	553 (77.3)
No	162 (22.7)
Previous computer gaming experience	
Yes	569 (79.6)
No	146 (20.4)
Participation in a virtual reality or metaverse-related application	
Yes	127 (17.8)
No	588 (82.2)

Table 2. Mean scores of nursing students for the Metaverse Perception Scale for Nursing Students

Scale and Subdimensions	Scale Range (Min-Max)	Obtained Range (Min-Max)	Mean ± SD
Education Subdimension	9-45	9-45	33,29±5,48
Technology Subdimension	5-25	5-25	18,79±3,26
Lifestyle Subdimension	5-25	5-25	18,20±3,12
Challenges Subdimension	5-25	5-25	12,88±3,56
Metaverse Perception Scale for Nursing Students (Total)	24-120	28-120	83,16±10,20

Table 3. Correlation values regarding the relationships between the subdimensions of the Metaverse Perception Scale for Nursing Students

	Education Subdimension	Technology Subdimension	Lifestyle Subdimension	Challenges Subdimension
Education Subdimension	1			
Technology Subdimension	,858*	-		
Lifestyle Subdimension	,733*	,757*	-	
Challenges Subdimension	-,379*	-,352*	-,323*	-

* $p<0.05$

Table 4. Comparison of Metaverse Perception Scale scores according to the descriptive characteristics of the nursing students (n=715)

		Education Subdimension	Technology Subdimension	Lifestyle Subdimension	Challenges Subdimension	Total Perception Score
		Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Gender	**Female**	33,23±4,933	18,72±2,957	18,18±2,820	12,94±3,295	83,06±9,221
	Male	33,45±6,766	18,97±3,976	18,27±3,827	12,73±4,189	83,42±12,516
	TEST	t=-,416 p=,677	t=-,794 p=,428	t=-,307 p=,759	t=,605 p=,546	t=-,367 p=,714
Age	**18 and under**	32,93±5,070	18,72±3,133	18,26±2,712	12,22±3,296	82,13±9,794
	19-20	33,35±5,196	18,97±3,130	18,29±3,064	12,81±3,396	83,42±9,840
	21-22	33,70±5,724	18,70±3,306	18,28±3,254	13,14±3,780	83,82±10,344
	23 and over	31,89±6,254	18,33±3,855	17,39±3,355	13,20±3,700	80,81±11,647
	TEST	F=2,007 p=,112	F=,801 p=,494	F=1,595 p=,189	F=1,738 p=,158	F=1,872 p=,133
Academic Grade	**1st Grade**	32,10±5,612	18,20±3,377	17,47±3,093	12,53±3,217	80,29±10,093
	2nd Grade	33,70±4,737	19,09±2,964	18,68±2,766	12,79±3,541	84,27±9,224
	3rd Grade	33,84±5,314	18,90±3,034	18,32±2,952	12,85±3,271	83,91±9,969
	4th Grade	33,41±6,158	18,89±3,628	18,23±3,560	13,36±4,090	83,89±11,149
	TEST	F=3,679 p=,012	F=2,572 p=,053	F=4,869 p=,002	F=1,659 p=,174	F=5,951 p=,001
	Difference	2-3-4>1	-	2>1	-	2-3-4>1
Marital Status	**Married**	28,50±9,629	16,30±5,982	14,90±5,626	13,60±5,420	73,30±19,721
	Single	33,35±5,381	18,82±3,200	18,25±3,051	12,87±3,527	83,30±9,960
	TEST	U=2090,000 p=,025	U=2605,500 p=,144	U=2025,000 p=,018	U=3148,500 p=,557	U=2058,500 p=,023
Type of high school graduated	**Regular high school**	32,90±5,757	18,70±3,813	17,70±3,881	10,75±3,177	80,05±11,799
	Private high school	31,57±6,791	17,97±3,764	17,13±3,857	13,37±4,716	80,03±11,637
	Anatolian high school	33,40±5,282	18,81±3,171	18,27±3,013	12,84±3,476	83,32±9,863
	Science high school	33,43±5,397	19,10±3,015	18,46±2,928	13,49±3,355	84,49±10,210
	Vocational high school	32,22±8,695	18,39±5,181	17,50±4,567	13,44±4,355	81,56±15,062
	TEST	KW=4,251 p=,373	KW=1,639 p=,802	KW=3,926 p=,416	KW=9,234 p=,056	KW=5,231 p=,264
Mother's educational status	**Illiterate**	32,08±4,766	18,38±3,029	17,73±3,665	13,92±3,457	82,10±9,740
	Primary school	32,94±5,608	18,57±3,288	18,00±3,167	13,08±3,617	82,58±10,446
	Middle school	32,97±5,487	18,64±3,334	17,85±2,796	13,23±3,570	82,70±9,797
	High school	34,46±5,262	19,32±3,051	19,08±2,918	12,43±3,374	85,29±10,080

	University	33,72±5,539	19,15±3,491	18,25±3,279	11,61±3,342	82,74±10,187
	TEST	F=2,865 p=,023	F=1,844 p=,119	F=4,094 p=,003	F=4,607 p=,001	F=2,117 p=,077
	Difference	4>1-2-3	-	4>2-3	1-2-3>5	-
Mother's occupation	**Homemaker**	33,02±5,439	18,69±3,255	18,12±3,136	13,00±3,573	82,83±10,181
	Civil servant	33,24±4,982	18,90±3,083	18,40±2,880	11,67±3,441	82,21±9,424
	Worker	36,03±5,224	20,01±3,081	19,04±3,054	12,18±3,345	87,26±9,790
	Tradesperson	30,79±7,154	17,11±4,095	16,79±3,537	13,47±3,454	78,16±11,922
	Retired	32,92±3,593	18,00±2,380	18,08±2,431	13,62±3,453	82,62±7,974
	Farmer	34,67±1,155	19,67±,577	19,33±1,155	16,00±3,606	89,67±3,786
	TEST	KW=21,492 p=,001	KW=13,107 p=,022	KW=10,158 p=,071	KW=12,039 p=,034	KW=20,703 p=,001
	Difference	3>1-4	3>1-4	-	1-6>2	3>1-4
Father's educational status	**Illiterate**	34,00±5,701	19,11±3,018	18,33±4,062	13,78±3,383	85,22±11,734
	Primary school	32,82±5,712	18,55±3,261	18,10±3,199	13,23±3,498	82,71±11,101
	Middle school	32,71±5,959	18,40±3,448	18,08±3,438	13,37±3,898	82,57±10,857
	High school	34,09±5,216	19,24±3,245	18,55±3,001	12,47±3,380	84,35±9,480
	University	33,28±4,865	18,82±3,024	17,94±2,710	12,43±3,394	82,47±9,080
	TEST	KW=6,599 p=,159	KW =6,374 p=,173	KW =6,236 =,182	KW =9,537 p=,055	KW =4,015 p=,404
Father's occupation	**Civil servant**	33,27±5,187	18,95±3,024	17,83±2,683	12,34±3,066	82,40±9,249
	Retired	33,60±5,439	18,82±3,323	18,40±3,170	12,68±3,528	83,50±10,563
	Other	33,04±5,605	18,71±3,287	18,15±3,198	13,21±3,691	83,11±10,196
	TEST	F=,792 p=,453	F=,249 p=,779	F=1,307 p=,271	F=3,126 p=,044	F=,442 p=,643
	Difference	-	-	-	3>1	-
Number of siblings	**None**	33,45±3,876	18,50±2,577	17,41±2,667	13,59±3,875	82,95±8,915
	One sibling	34,04±5,201	19,12±3,168	18,65±2,853	12,50±3,430	84,31±9,876
	Two siblings	33,43±5,629	18,97±3,276	18,25±3,104	13,02±3,525	83,68±10,183
	Three siblings	32,43±5,364	18,41±3,099	17,85±3,161	12,67±3,581	81,36±9,896
	Four or more siblings	31,71±5,902	17,92±3,572	17,39±3,647	13,60±3,759	80,62±11,065
	TEST	KW=21,465 p=,000	KW=12,371 p=,006	KW=15,346 p=,002	KW=9,504 p=,023	KW=16,026 p=,001
	Difference	2>5	2>5	2>5	1-5>2	2>5
Current place of residence	**State dormitory**	33,10±5,378	18,80±3,188	18,18±3,069	13,03±3,460	83,10±9,761
	Family home	34,56±5,855	19,03±3,518	18,60±3,352	12,28±3,651	84,47±11,233
	Private dormitory	32,64±4,318	18,29±2,747	17,82±2,366	12,47±3,371	81,22±8,925
	Own home	32,71±7,381	18,54±4,511	17,71±4,339	13,50±5,073	82,46±15,657
	TEST	KW=9,908 p=,019	KW=3,537 p=,316	KW=3,036 p=,386	KW=5,144 p=,162	KW=4,526 p=,210

		Education Subdimension	Technology Subdimension	Lifestyle Subdimension	Challenges Subdimension	Total Perception Score
		Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Gender	**Female**	33,23±4,933	18,72±2,957	18,18±2,820	12,94±3,295	83,06±9,221
	Male	33,45±6,766	18,97±3,976	18,27±3,827	12,73±4,189	83,42±12,516
	TEST	t=-,416 p=,677	t=-,794 p=,428	t=-,307 p=,759	t=,605 p=,546	t=-,367 p=,714
Age	**18 and under**	32,93±5,070	18,72±3,133	18,26±2,712	12,22±3,296	82,13±9,794
	19-20	33,35±5,196	18,97±3,130	18,29±3,064	12,81±3,396	83,42±9,840
	21-22	33,70±5,724	18,70±3,306	18,28±3,254	13,14±3,780	83,82±10,344
	23 and over	31,89±6,254	18,33±3,855	17,39±3,355	13,20±3,700	80,81±11,647
	TEST	F=2,007 p=,112	F=,801 p=,494	F=1,595 p=,189	F=1,738 p=,158	F=1,872 p=,133
Academic Grade	**1st Grade**	32,10±5,612	18,20±3,377	17,47±3,093	12,53±3,217	80,29±10,093
	2nd Grade	33,70±4,737	19,09±2,964	18,68±2,766	12,79±3,541	84,27±9,224
	3rd Grade	33,84±5,314	18,90±3,034	18,32±2,952	12,85±3,271	83,91±9,969
	4th Grade	33,41±6,158	18,89±3,628	18,23±3,560	13,36±4,090	83,89±11,149
	TEST	F=3,679 p=,012	F=2,572 p=,053	F=4,869 p=,002	F=1,659 p=,174	F=5,951 p=,001
	Difference	2>3	-	-	-	-
Daily time spent on the internet	**0–5 h**	33,43±5,433	18,85±3,231	18,19±3,110	12,91±3,554	83,39±10,299
	6–10 h	33,38±5,037	18,94±2,969	18,38±2,888	12,69±3,402	83,40±9,177
	10–15 h	28,70±8,755	15,55±5,094	16,55±4,989	14,25±4,887	75,05±14,799
	TEST	KW=5,103 p=,078	KW=11,159 p=,004	KW=3,450 p=,178	KW=1,899 p=,387	KW=6,639 p=,036
	Difference	1-2>3	1-2>3	-	-	1-2>3
Most frequently used technological device	**Phone**	33,23±5,436	18,73±3,247	18,16±3,094	12,93±3,506	83,05±10,102
	Computer	34,63±7,641	20,06±3,473	19,50±3,540	9,38±3,324	83,56±12,291
	Tablet	34,54±4,892	20,08±3,427	18,77±3,789	14,92±3,947	88,31±12,230
	TEST	KW=1,730 p=,421	KW=4,481 p=,106	KW=2,280 p=,320	KW=19,335 p=,000	KW=2,854 p=,240
	Difference	-	-	-	1-3>2	-
Heard of the metaverse before	**Yes**	35,07±5,346	19,70±3,419	18,85±3,114	11,81±3,539	85,44±10,911
	No	32,38±5,330	18,32±3,080	17,87±3,073	13,43±3,442	82,00±9,629
	TEST	t=6,373 p=,000	t=5,432 p=,000	t=4,027 p=,000	t=-5,866 p=,000	t=4,311 p=,000
If yes, what they think the metaverse is	**Virtual world**	35,64±5,251	20,10±3,418	19,06±3,016	11,79±3,477	86,59±10,707
	Artificial intelligence	34,56±2,307	19,00±2,000	18,94±2,182	12,72±3,847	85,22±5,927
	Three-dimensional form of the internet	35,20±1,483	20,40±2,881	19,20±1,304	9,00±1,414	83,80±3,194

	A platform offering entertainment and interaction	32,47±5,345	18,34±3,083	17,90±3,075	13,32±3,445	82,04±9,638
	Do not know	34,93±8,109	19,57±4,926	18,21±5,087	10,43±4,380	83,14±19,382
	TEST	KW=38,545 p=,000	KW=40,517 p=,000	KW=19,410 p=,001	KW=42,617 p=,000	KW=24,622 p=,000
	Difference	1>4	1>4	1>4	4>1-5	1>4
If no, what they think the metaverse is	**Virtual universe**	34,70±4,655	19,48±2,697	18,98±2,926	12,66±3,507	85,82±9,645
	Related to the internet	33,38±4,456	19,05±3,257	18,73±3,185	13,41±4,017	84,57±9,951
	Related to artificial intelligence	34,06±6,470	19,25±3,464	18,63±2,768	13,44±3,564	85,38±11,791
	Something technological	33,22±4,133	19,03±2,177	18,94±2,368	12,19±3,146	83,38±6,364
	Related to medicine/education	31,24±4,146	17,52±2,337	17,19±2,620	14,24±2,278	80,19±8,790
	Digital	31,67±3,445	18,50±2,074	17,83±2,483	14,00±2,280	82,00±6,812
	Related to psychology	30,00±4,243	17,50±3,536	16,00±1,414	15,00±,000	78,50±9,192
	Informatics	34,82±5,154	19,00±2,408	16,09±3,780	14,36±4,249	84,27±8,272
	Do not know	33,14±5,672	18,69±3,402	18,10±3,184	12,77±3,586	82,71±10,431
	TEST	KW=12,000 p=,151	KW=9,873 p=,274	KW=13,569 p=,094	KW=12,695 p=,123	KW=9,632 p=,292
Best learning method	**Writing**	32,69±5,669	18,55±3,345	17,94±3,281	13,12±3,572	82,30±10,070
	Reading	34,54±4,665	19,09±2,989	18,64±2,763	12,31±3,448	84,58±8,567
	Seeing	33,11±5,626	18,67±3,317	17,98±3,162	13,08±3,762	82,84±11,079
	Practicing	33,54±5,412	18,96±3,234	18,40±3,035	12,75±3,482	83,65±10,337
	TEST	F=2,516 p=,057	F=,975 p=,404	F=1,641 p=,178	F=1,244 p=,293	F=1,328 p=,264
Perception that the metaverse is related to health and education	**Yes**	33,79±5,338	19,05±3,154	18,44±3,009	12,84±3,561	84,12±9,806
	No	31,56±5,629	17,90±3,469	17,40±3,359	13,01±3,544	79,87±10,855
	TEST	t=4,615 p=,000	t=3,792 p=,000	t=3,752 p=,000	t=-,528 p=,598	t=4,731 p=,000
Previous computer gaming experience	**Yes**	33,72±5,528	19,02±3,270	18,34±3,121	12,82±3,642	83,89±10,236
	No	31,60±4,966	17,88±3,077	17,66±3,065	13,14±3,195	80,29±9,575
	TEST	t=4,223 p=,000	t=3,783 p=,000	t=2,345 p=,019	t=-,995 p=,320	t=3,846 p=,000
Participation in a virtual reality or metaverse-related application	**Yes**	35,57±5,948	20,21±3,463	18,94±3,441	11,84±4,130	86,57±10,671
	No	32,79±5,251	18,48±3,135	18,04±3,026	13,11±3,381	82,42±9,955
	TEST	t=5,287 p=,000	t=5,548 p=,000	t=2,940 p=,003	t=-3,225 p=,002	t=4,202 p=,000

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