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Investigation of Metaverse Knowledge Attitude and Awareness Levels of Students Studying in the Faculty of Health Sciences of a University According to Variables

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ABSTRACT

Purpose: This study was conducted as a descriptive study to investigation of metaverse knowledge, attitude and awareness levels of health sciences students according to variables.

Methods: The research was completed with a total of 334 students who agreed to participate in the research between April and May 2023 at the Faculty of Health Sciences of a University in a metropolitan city in Turkey. Introductory Characteristics Form and Metaverse Scale were used for data collection.

Results: Metaverse total score average of the students was 48.5±12.45, and the mean scores of sub-dimensions were respectively; Technology Dimension is 22.8±6.04, Digitization Dimension is 8.8±3.48, Life Dimension is 10.3±3.27, Social Dimension is 6.6±2.34. It was found that Metaverse knowledge, attitude and awareness levels of the students who were married, living in a dormitory, having a high income level, studying in the 4th grade, studying in the department of nursing and audiology, having heard the concept of metaverse before, experienced virtual reality, and defined their internet usage skills as high ($p<0.05$). A significant positive correlation was found between age and digitalization sub-dimension ($r=0.179;p=0.001$).

Conclusion: As a result, it can be said that the students studying in health sciences do not have a comprehensive knowledge of the concept of metaverse and that their knowledge, attitude and awareness levels of the metaverse are affected by some socio-demographic variables and variables such as the department they studied, hearing the concept of metaverse before, experiencing virtual reality, and internet use skills.

Keywords: Augmented reality, educational technology, students, health education, virtual reality.

ÖZET

Amaç: Bu araştırmada sağlık bilimleri fakültesi öğrencilerinin metaverse bilgi tutum ve farkındalık düzeylerinin belirlenmesi amacıyla tanımlayıcı olarak yapılmıştır.

Gereç ve Yöntem: Araştırma Türkiye'nin metropol bir kentindeki bir Üniversitesinin Sağlık Bilimleri Fakültesi'nde Nisan-Mayıs 2023 tarihleri arasında araştırmaya katılmayı kabul eden toplam 334 öğrenci ile tamamlanmıştır. Verilerin toplanmasında Tanıtıcı Özellikler Formu ve Metaverse Ölçeği kullanıldı.

Bulgular: Öğrencilerin Metaverse toplam puan ortalaması 48.5±12.45 olup, alt boyutlarının puan ortalaması sırasıyla; Teknoloji Boyutu 22.8±6.04, Dijitalleşme Boyutu 8.8±3.48, Yaşam Boyutu 10.3±3.27, Sosyal Boyutu 6.6±2.34'dür. Çalışmada evli olan, yurtta yaşayan, gelir düzeyi fazla olan, 4.sınıfta öğrenim gören, hemşirelik ve odyoloji bölümünde okuyan, metaverse kavramını daha önce duyan, sanal gerçeklik deneyimleyen, internet kullanım becerisini yüksek olarak tanımlayan öğrencilerin Metaverse bilgi tutum ve farkındalık düzeylerinin anlamlı şekilde yüksek olduğu bulunmuştur ($p<0.05$). Ayrıca yaş ile dijitalleşme alt boyutunda pozitif yönde anlamlı bir ilişki bulunmuştur ($r = 0.179$; $p = 0.001$).

Sonuç: Sonuç olarak sağlık bilimlerinde eğitim gören öğrencilerin metaverse kavramı hakkında kapsamlı bir bilgiye sahip olmadıkları ve metaverse bilgi, tutum ve farkındalık düzeylerinin bazı sosyo-demografik değişkenlerden ve okuduğu bölüm, metaverse kavramını daha önce duyma, sanal gerçeklik deneyimi yaşama, internet kullanım becerisi gibi değişkenlerden etkilendiği söylenebilir.

Anahtar Kelimeler: Arttırılmış gerçeklik, eğitim teknolojisi, öğrenciler, sağlık eğimi, sanal gerçeklik.

The importance of the metaverse concept, which we have started to hear in technological developments in recent years, has increased even more with the COVID 19 pandemic process. It is thought that the importance of this concept will gradually increase all over the world (1).

Metaverse consists of the words "meta" meaning beyond and "verse" meaning universe (2,3). Metaverse is defined as a three-dimensional virtual world where all transactions can be performed with the help of virtual reality and augmented reality technologies (4). Today, it is mostly used for gaming, marketing, shopping, economy, advertising, social communication, and education. It is also seen that the concept of metaverse is used in sectors such as health, tourism, military and real estate (5).

The basis of metaverse technology is virtual reality or augmented reality and simulations. While virtual reality has actually been used for military and space studies, which are costly technologies, for many years; in recent years, there has been an increase in its use in the fields of health, education, gaming, libraries, museums and industrial design (6). Metaverse technology can also be used to prepare professionals in many fields for different situations or to improve their skills and competencies. Digitalized health and education fields are considered to be important and distinctive areas where this technology is used extensively (7).

Car et al. sub-contents of the metaverse used in the field of education;

- Online and Offline Computer Based Education,
- Open and Online Course,
- Virtual Reality (VR),
- Augmented Reality (AR),
- Mobile Learning,
- Gamification and Psychomotor Skills Training (7).

In education, it is stated that classical techniques are no longer sufficient to realize education by keeping educators and students in interaction. This situation has led to the need to create new educational methods with the developing technology. Today, different metaverse technologies are used in the education sector. These technologies include personalization of medicine, nanotechnology, the use of 3D printers, mobile health technologies, artificial intelligence, virtual reality and simulations (8).

Virtual reality, which is frequently used in the field of education, is defined as a simulated world run by a computer system. In this world, the person is enabled to interact between real life and emotions. It is stated that this is the feature that distinguishes virtual reality from other different technologies such as television (7). Virtual reality is an illusion that makes a person feel as if they are there, even though they are not actually there (9). In another definition, virtual reality or augmented reality is defined as "an experience in which a user enters a virtual world (consisting of three-dimensional objects) using a computer or mobile device while physically remaining in their real world" (10).

Simulation is defined as "a form of learning that mimics and explains real-life clinical situations". Simulation is a method in which students gain experience in an environment or situation that reflects reality, without the risk of harming the patient, and provides the opportunity to think logically and make decisions in a clinical setting (11).

It reveals the need to make more use of virtual reality technologies and simulations in order to improve the education and practice process of healthcare and professional professionals. These technologies provide a comprehensive teaching model in the field of education and help students develop new ideas and problem-solving skills (12). This new educational model creates an accessible learning space for all students in a virtual environment with technologies combined with interactive, imagery and three-dimensional visualization techniques and allows them to use it at any time (12). The use of simulation is recommended to avoid harming patients, reduce errors, increase the quality of education, the number of applications and student satisfaction. These technologies reduce the student's stress, increase self-confidence, improve clinical decision-making skills and provide permanent learning by giving feedback to the student at the end of the application by allowing the scenarios to be applied as much as desired in a clinical environment that is not risky for the student. In this respect, the importance of virtual reality applications in health education is increasing (12,13). There are many different types of simulations used in health education, ranging from simple to complex.

Simulation types;

a. Mannequins or models with low technological features,

b. Standardized/simulated patient role plays

c. Computer-aided simulation

d. Simulations for learning complex functions

e. Integrated, hybrid simulations, implemented in five different ways (14).

Although virtual reality applications have many positive features, they also have some negative features that have been criticized. Although virtual reality is very close to real situations, it is stated as an important point that it cannot replace learning in a one-to-one clinical environment. It is seen that students cannot adapt to the virtual environment and practice more insensitively in the virtual environment because they cannot receive feedback like a real patient. It is thought that abnormal practices will make it difficult to evaluate the student's real knowledge-skills and approach, and at the same time cause time losses in education. In addition, it causes students who encounter this method for the first time to experience stress while practicing and negatively affects the learning process (15).

The use of metaverse technology, which is being used in every field today, is becoming increasingly widespread in the field of health. Metaverse has a high potential to bring new directions to the future of healthcare services with the effective use of the technologies it covers. Technologies that will enable the metaverse in healthcare (artificial intelligence, virtual reality, augmented reality, edge computing, etc.) have started to be used in many areas such as education, research, patient care, rehabilitation services and clinical applications. In addition, potential improvements are expected in many areas such as treatment effectiveness, cost, health workforce, education and patient satisfaction in healthcare services with metaverse. Metaverse technology has brought important innovations in the training of health manpower, especially in applied training. The use of metaverse technology in the education of students receiving health education increases the quality of education and provides students with the opportunity to practice in a safe area without fear of negative consequences. The use of metaverse technology for nurse, physiotherapist, dietician, audiologist, audiologist, sports specialist and social worker candidates, who will have an important place in the workforce planning of health services, will contribute to the acquisition of the necessary application skills and the development of clinical decision-making skills. Health sciences students need to be equipped with the necessary knowledge to adapt to and leverage these technological advancements in their future careers. Studying health sciences students can provide insights into how these applications may impact their future practices. Understanding how students in this specific field perceive and engage with the metaverse is important for aligning education and training with evolving technological landscapes. Health sciences students may encounter unique ethical challenges when dealing with virtual environments, such as issues related to patient privacy, data security, and the ethical use of virtual technologies in medical settings. Examining their knowledge, attitudes, and awareness levels can shed light on these ethical considerations (6-8,10,11). When we look at the literature, we see that there are limited studies examining the knowledge, attitudes and behaviors of students studying in the field of health about the concept of metaverse, which shapes the future (16,17). The aim of this study is to examine the metaverse knowledge, attitudes and awareness levels of students studying in the faculty of health sciences of a university according to various variables and to provide guidance in determining the requirements for studies to be conducted in the field of metaverse, which is a developing technology. It is thought that this study will contribute to the literature in this respect.

Materials and Methods

Purpose of the Study

The aim of this study is investigation of metaverse knowledge attitude and awareness levels of students studying in the faculty of health sciences of a university according to variables.

This research is a descriptive and quantitative study.

Time and Settings

This study was conducted with students enrolled in the Faculty of Health Sciences of a Foundation University in the spring semester of the 2022-2023 academic year. Immediately after the 17.03.2023 dated permission letter, the questionnaires were sent to the students' personal cell phones. The research was conducted between March and May 2023.

Population and Sample of the Study

The population of the study consists of 1301 students enrolled in undergraduate programs in the spring semester of 2022-2023 at the Faculty of Health Sciences of a Foundation University. The sample of the study was determined according to the formula for the number of individuals in the population (Formula 1). The population of the study consisted of 1301 students.

$$n = \frac{(1301)\times(1.96)^2\times(0.5)\times(0.5)}{(0.05)^2\times(1301-1)+(1.96)^2\times(0.5)\times(0.5)} = 297$$

Number of students to be sampled by departments		
Department	**Total Number of Students**	**Minimum number of students**
Nursing	280	64
Audiology	136	31
Nutrition and Dietetics	301	68
Physiotherapy and Rehabilitation	262	60
Exercise and Sport Science	104	24
Healthcare Management	66	15
Social Work	152	35
Total	**1301**	**297**

In total, a minimum of 297 students were planned to be included in the sample. The number of students to be included according to departments was shown by stratified sampling method. The research was completed with 334 students.

Measurements

In order to collect the data in the study, the "Introductory Characteristics Form" and the "Metaverse Scale" were used to question the socio-demographic characteristics of the students, which were created by utilizing the literature.

Introductory Characteristics Form: This form includes 21 questions about individual characteristics, social media use and frequency, and access to developing technology (14-18).

Metaverse Scale: The metaverse scale developed by Süleymanoğulları et al. in 2022 consists of 15 items and four sub-dimensions: technology, digitalization, social and lifestyle. The scale is 5-point Likert type. It is scored as 1=Disagree and 5=Agree. The lowest score is 15 and the highest score is 75. The higher the scores obtained from the scale, the higher the level of knowledge, attitude and awareness of the metaverse concept. It is stated that this scale is an effective scale related to the metaverse concept and can be used to determine the knowledge, attitudes and awareness of individuals about the metaverse, which is an important issue of recent times. Cronbach's alpha reliability coefficient value is 0.813 (18)**.** In this study, Cronbach's alpha was 0.807.

Data Collection Process

After obtaining the necessary permissions for the research, the purpose of the research was explained to the participants and the data collection form created in electronic environment was sent to their smart phones to those who agreed to participate in the study. The completion time of the forms was approximately 10 minutes. Link to the form:https://docs.google.com/forms/d/1PzXcBd-qICpF0N85okZPLBm9lz1Im5CiSjgWZrVAYcIk/edit . If no response was received after one week, the same e-mail was sent to the participants two more times at three-day intervals.

In order to check the comprehensibility of the questions in the questionnaire, a pre-application was made to 30 students studying at the Faculty of Health Sciences of the University where the study was conducted. Since no changes were made to the questions, the students who were pre-applied were included in the sample.

Statistical Analysis

Statistical Package for Social Science (SPSS 25 for Windows) package program was used to evaluate the data. The data were first evaluated with the Kolmogorov-Smirnov test, kurtosis and skewness coefficients and histograms for conformity to normal distribution. Since the kurtosis and skewness values of the data showed normal distribution, parametric tests were used in the analysis. Independent Sample T-Test was used for the comparison of binary variables and One Way Anova test was used for the comparison of three or more variables.

Ethical Process

The necessary permissions were obtained from the Social and Human Sciences Research Council of the University where the research was conducted, the letter dated 17/03/2023 and numbered 215658, and from the Dean of the Faculty of Health Sciences of the university where the research was conducted, from the students who agreed to participate in the research. In addition, the necessary permissions were obtained by e-mail from the people who performed the validity and reliability of the scales. This study was conducted in accordance with the principles of the Declaration of Helsinki.

Table 1: Descriptive Characteristics of Students (n=334)

	n	%
Mean Age = 21.5±2.86		
Gender		
Female	269	80.5
Male	65	19.5
Marital Status		
Single	327	97.9
Married	7	2.1
Class		
1	100	29.9
2	79	23.7
3	78	23.4
4	77	23.1
Place where he/she spends most of his/her life		
Village	8	2.4
District	45	13.5
Province	281	84.1
Place of Stay		
Dormitory	48	14.4
With family	247	74.0
Home alone	18	5.4
At home with friend	21	6.3
Completing a Higher Education Program Before		
Finished	7	2.1
Did not finish	327	97.9
Family Income Level		
Income less than expenditure	32	9.6
Income equal to expenditure	193	57.8
Income more than expenditure	109	32.6
Internet Access Tool*		
Wi-Fi	287	85.9
Mobile data	82	24.6
Time Spent on the Internet		
Less than 1 Hour	5	1.5
1-3 Hours	65	19.5
3-5 Hours	155	46.4
5 Hours and Over	109	32.6
Internet Use Skills		
Low	11	3.3
Middle	183	54.8
High	140	41.9
Technological Tools Used to Use the Internet*		
Telephone	318	95.2
Computer	149	44.6
Tablet	35	10.5
Previous Participation in Online Training		
Yes	325	97.3
No	9	2.7
Finding Online Education Useful		
Yes	113	33.8
No	221	66.2
Hearing the Definition of Metaverse Before		
Yes	156	46.7
No	178	53.3
Virtual Reality Experience Status		
Yes	59	17.7
No	275	82.3
Experiencing Virtual Reality with Games		
Yes	108	32.3
No	226	67.7
Avatar Creation Status		
Yes	147	44.0
No	187	53.3
**More than one option was selected.*		

Results

The mean age of the students participating in the study was 21.5±2.86 years, 80.53% (n=269) were female and 19.5% (n=65) were male. 29.9% (n=100) of the students were in 1st grade, 23.7% (n=79) were in 2nd grade, 23.4% (n=78) were in 3rd grade, and 23.1% (n=77) were in 4th grade. Most of the students are single (97.9%), have spent most of their lives in the province (84.1%), currently live with their families (74.0%) and have not completed any higher education program before (97.9%). Regarding family income levels, 57.8% (n=193) of the students stated that their income was equal to their expenses (Table 1).

Among the students who participated in the study, 85.9% (n=287) stated that they use wifi for internet access, 46.4% (n=155) stated that they spend 3-5 hours a day on average on the internet, 54.8% (n=183) defined their internet usage skills as average, 97.3% (n=325) stated that they had participated in online education before, 66.2% (n=221) stated that they did not find online education useful. 53.3% (n=178) of the students stated that they had not heard of the concept of metaverse before, 82.3% (n=275) had not experienced virtual reality before, 67.7% (n=226) had not experienced a game involving virtual reality before, and 53.3% (n=187) had not created a virtual avatar before (Table 1).

The mean total score of the Metaverse of the students participating in the study was 48.5±12.45, and the mean scores of the sub-dimensions were; Technology Dimension 22.8±6.04, Digitalization Dimension 8.8±3.48, Lifestyle Dimension 10.3±3.27, Socialization Dimension 6.6±2.34 (Table 2).

When the relationship between the descriptive characteristics of the students and the Metaverse scale was compared, a statistically significant difference was found between the digitalization sub-dimension and marital status (p=0.000). The mean score of the digitalization sub-dimension of those who were married was found to be higher than those who were single (Table 3).

Place of stay was found to have a significant difference with the socialization sub-dimension (p=0.030). The mean socialization sub-dimension score of the students staying in dormitories was higher than the students staying with their families or living alone and with friends at home (Table 3).

A significant relationship was found between students' income levels and the digitalization sub-dimension (p=0.034). The average of the digitalization sub-dimension of the students who defined their income as more than their expenses was higher than the students who defined their income as less than or equal to their expenses (Table 3).

A significant difference was found between the grade levels of the students participating in the study and the total sub-dimensions of technology, digitalization, lifestyle and metaverse (p=0.000; p=0.036; p=0.000; p=0.002, respectively). While the mean scores of 4th graders were higher in technology, lifestyle and metaverse total sub-dimensions, the mean scores of 3rd graders were higher in digitalization sub-dimension (Table 3).

Table 2: Distribution of Metaverse Scale Item Total and Subscale Score Averages

	n	Mean±Sd	Min-Max
Technology	334	22.8±6.04	7-35
Digitalization	334	8.8±3.48	3-39
Lifestyle	334	10.3±3.27	3-15
Socialization	334	6.6±2.34	2-10
Metaverse Total	334	48.5±12.45	5-75

Table 3: Comparison of Students' Descriptive Characteristics and Metaverse Scale Item Total and Subscale Scores

	N	Technology			Digitalization			Lifestyle			Socialization			Metaverse Total		
		X±Sd	Test	p	X±Sd	Test	p	X±Sd	Test	p	X±Sd	Test	p	X±Sd	Test	p
Marital Status																
Single	327	22.9±6.09			8.7±3.07	-4.213	**0.00**	10.3±3.30	0.707	0.480	6.6±2.35	0.676	0.499	48.5±12.46	-0.441	0.660
Married	7	21.0±2.08	.817	0.414	**14.1±11.24**			9.4±1.90			6.0±1.73			50.6±12.62		
Place of Stay																
Dormitory	48	22.6±6.31			8.7±3.27			10.0±3.62			**7.4±2.11**			48.7±12.94		
With family	247	22.9±6.10			8.8±3.621			10.3±3.27			6.4±2.37			48.4±12.62		
Home alone	18	22.8±4.53	0.072	0.975	8.6±1.88	0.084	0.969	10.7±2.71	0.320	0.811	6.4±2.14	3.019	**0.030**	48.5±8.54	.057	0.982
At home with friend	21	23.3±6.11			8.5±3.60			10.6±3.13			7.1±2.19			49.5±12.89		
Family Income Level																
Income less than expenditure	32	20.8±6.41	2.288	0.103	7.3±3.14	3.414	**.034**	9.6±4.09	1.218	0.297	7.3±2.10	1.685	0.187	45.0±12.50	1.661	0.192
Income equal to expenditure	193	22.9±6.19			8.8±3.74			10.2±3.24			6.5±2.43			48.5±12.99		
Income more than expenditure	109	23.3±5.56			**9.1±2.98**			10.6±3.05			6.5±2.22			49.5±11.33		
Class																
1	100	22.5±6.39			8.8±3.09			10.3±3.31			6.4±2.39			48.0±13.20		
2	79	20.9±6.72			7.9±3.26			9.1±3.72			6.7±2.44			44.5±13.90		
3	78	23.4±4.89	5.945	**0.001**	**9.3±4.37**	2.871	**0.036**	10.6±2.66	6.341	**0.000**	6.5±2.13	.303	0.824	49.9±9.67	5.134	**0.002**
4	77	**24.8±5.30**			9.2±3.03			**11.2±2.96**			6.7±2.38			**51.9±11.35**		
Department																
Nutrition and Dietetics	82	22.5±6.55			8.9±3.13			10.2±3.51			6.6±2.55			48.3±13.82		
Exercise and Sport Sciences	25	21.0±5.38			8.3±2.50			9.4±3.27			6.5±2.02			45.2±11.24		
Physiotherapy and Rehabilitation	58	22.0±6.10	1.394	0.216	8.8±5.00	0.548	0.772	9.3±3.05	2.218	**0.041**	5.8±2.51	2.793	**0.012**	46.0±13.04	1.367	0.227
Nursing	79	24.0±5.83			9.0±2.87			**11.2±2.93**			6.5±2.20			50.7±11.44		
Audiology	34	23.2±5.76			8.7±3.73			10.2±3.27			**7.8±2.02**			49.9±11.56		
Healthcare Management	20	24.5±5.01			9.3±2.79			10.8±2.51			7.0±2.06			51.5±10.05		
Social Work	36	22.4±6.13			8.0±3.31			10.5±3.79			6.9±2.10			47.7±12.66		

When the departments in which the students were studying were compared, the mean score of the lifestyle sub-dimension was found to be significantly higher in nursing department students than in other departments (p=0.041). The mean score of the socialization sub-dimension was significantly higher in audiology department students than in other department (p=0.012) (Tablo 4).

A significant difference was found in the technology (p=0.013), lifestyle (p=0.002), and metaverse total mean score (p=0.024) with whether the students had heard of the concept of Metaverse before or not. Those who had heard of the concept of Metaverse before had higher technology, lifestyle, and metaverse total mean scores (Table 4).

The mean scores of technology (p=0.004; p=0.009), lifestyle (p=0.037; p=0.032) sub-dimensions and metaverse total mean scores (p=0.010; p=0.031) of those who had experienced virtual reality and games involving virtual reality were significantly higher than those who had not (Table 4).

When asked about Internet use skills, a significant difference was found with the lifestyle sub-dimension (p=0.003). The life style sub-dimension mean score of the students who defined their Internet use skills as high was found to be higher than the students who defined their Internet use skills as low or average (Table 4).

Table 4: Comparison of Students' Introductory Characteristics Related to Technology and Metaverse Scale Item Total and Subscale Scores

	N	Technology			Digitalization			Lifestyle			Socialization			Metaverse Total		
		X±Sd	Test	p	X±Sd	Test	p	X±Sd	Test	p	X±Sd	Test	p	X±Sd	Test	p
Hearing the Definition of Metaverse Before																
Yes	156	**23.7±5.33**			8.9±2.77			**10.9±2.81**			6.6±2.23			**50.2±10.74**		
No	178	22.1±6.51	2.504	**0.013**	8.7±4.01	0.583	0.560	9.8±3.56	3.179	**0.002**	6.6±2.44	0.305	0.761	47.1±13.65	2.265	**0.024**
Virtual Reality Experience Status																
Yes	59	**24.9±4.91**	2.882	**0.004**	9.3±2.58	1.279	0.202	**11.1±2.6**1	2.090	**0.037**	7.0±2.38	1.4740	0.141	**52.3±10.22**	2.586	**0.010**
No	275	22.4±6.17			8.7±3.64			10.1±3.38			6.5±2.32			47.7±12.75		
Experiencing Virtual Reality with Games																
Yes	108	**24.1±5.96**	2.628	**0.009**	9.1±2.89	1.037	0.300	**10.9±3.080**	2.152	**0.032**	6.6±2.13	.198	0.843	**50.6±12.21**	2.166	**0.031**
No	226	22.5±5.99			8.6±3.73			10.0±3.34			6.6±2.43			47.5±12.64		
Internet Use Skills																
Low	11	20.9±7.48			7.8±4.49			7.45±4.50			5.45±2.54			41.63±18.40		
Middle	183	22.5±6.22	1.818	0.164	8.7±3.84	0.739	0.478	10.10±3.42	6.098	**0.003**	6.7±2.43	1.556	0.213	47.9±13.17	2.652	0.072
High	140	23.5±5.63			9.0±2.86			**10.8±2.83**			6.5±2.19			49.8±10.67		

There is a significant positive relationship between the digitalization sub-dimension and the age of the students. As the age of the students increased, the mean item total scores of the digitalization subscale increased (r=0.179; p=0.001) (Table 5).

Table 5: Correlation between Age and Digitalization Subdimension (n=334)

		Digitalization
Age	r	0.179
	p	**0.001**

Discussion

In this section, the findings are discussed in line with the literature. In the study, it was aimed to examine the metaverse knowledge, attitudes and awareness levels of students studying in the faculty of health sciences of a university according to various variables

When students' metaverse knowledge, attitudes and awareness levels were compared according to their gender, no significant relationship could be established with any of the sub-dimensions. This may be due to the development of technology without gender discrimination. In addition, Turan et al. (17) found that gender had no effect on metaverse knowledge attitude and awareness level in their study in which metaverse knowledge levels were examined according to some variables. Unlike the study, in a study conducted by Savaş et al. (16) it was determined that the mean score of the digitalization sub-dimension of males was significantly higher than females. It may be due to the fact that men are more involved in the digital world (games, inventions, etc.) and women approach new virtual environments more cautiously due to the thought that they cannot adapt to this world.

Looking at the total score comparison of the sub-dimensions in the metaverse knowledge levels of the students regarding their marital status; a significant difference was found with the digitalization sub-dimension and no significant difference was found in other sub-dimensions. In the digitalization sub-dimension, the average score of the married students was found to be higher. Unlike this study, in a study conducted by Turan et al. (17), the mean score of the social sub-dimension of singles was found to be significantly higher than marrieds. No significant difference was found in other sub-dimensions and total scores. In this study, married students' high scores in the digitalization subscale may be related to greater exposure to technology and virtual environments in more social or family environments. These findings align with studies suggesting that social contexts can influence one's familiarity and comfort with emerging Technologies (19,20).

When the total score comparison of the sub-dimensions of the metaverse knowledge levels of the students participating in the study was examined, a significant difference was found in all sub-dimensions except the socialization sub-dimension. In this study, it was determined that the mean scores of the students increased as the grade level increased. Suh and Seongjin (21) reported in a study that as the grade level increases, students can use metadata products more easily and their motivation to use them increases. Fourth-grade students, and specifically those in nursing and audiology departments, showing higher metaverse knowledge, attitudes, and awareness levels could indicate that more advanced students or those in certain disciplines may have encountered or integrated metaverse-related concepts into their coursework. Different departments may have varying degrees of integration of emerging technologies into their curriculum. As the education level of students increases, they tend to research and use more information professionally. In addition, as the grade increases, health sciences students may have the opportunity to experience in digital environments before these applications, as they go to clinical and field applications. Unlike this study, Savaş et al. (16) found no statistically significant difference in the sub-dimensions and total scores of students' metaverse knowledge levels according to their grade levels.

In this study, a significant positive relationship was found between age and digitalization sub-dimension. In a study conducted in Singapore, it was determined that 77.0% of young Singaporeans between the ages of 18-35 were interested in the metaverse (21). Unlike this study, Statista (22) found that the older the age, the less knowledge about the metaverse concept. It was determined that 18.0% of Generation Z (born between 1996 and 2015) had heard a lot about the metaverse and 16.0% of Generation Y (born between 1977 and 1995) were aware of the virtual reality environment (22). In Newzoo's (23) "Decade of Gamer Consumer Research" report, it was stated that Generation Z plays online games in 25.0% of their free time, 81.0% of gamers play digital games, and more than half of gamers under the age of 50 want to continue to be in the gaming world.

Comparisoning of metaverse knowledge level and total score of sub-dimensions according to where the students participating in the study are currently staying, a significant difference was found with the socialization sub-dimension. It is thought that this may be due to the fact that students living in dormitories have more peer groups around them, are in more social environments and transfer information more easily compared to students living at home.

When the income level of the students was questioned, a significant difference was found in the digitalization sub-dimension when the metaverse knowledge level and the total scores of the sub-dimensions were compared. The digitalization sub-dimension of the students who marked their income level as "my income is more than my expenses" was found to be higher.

The association between higher metaverse knowledge, attitudes, and awareness levels with a self-defined high income level may suggest that individuals with more financial resources are better equipped to access and engage with technology, including the metaverse. This aligns with a common trend where higher socioeconomic status is linked to greater access to digital tools and experiences (19,20).

When the students' internet usage skills were questioned, a significant difference was found in the lifestyle sub-dimension when looking at the comparison of the metaverse knowledge level and the total score of the sub-dimensions. The life style sub-dimension of the students who defined their internet use skills as high was higher than the other dimensions and the total score. This variable means that students with high Internet use skills hear and use the concept of metaverse in their lives. In a similar study conducted by Savaş et al. (16), when the level of internet usage of the participants and the sub-dimensions and total mean scores of the metaverse knowledge levels were compared, it was observed that the mean score of the digitalization sub-dimension of the participants with high internet usage skills was significantly higher. The association between high internet usage skills and higher metaverse knowledge, attitudes, and awareness levels suggests that proficiency in navigating online platforms is a relevant factor. This aligns with the broader concept that digital literacy and skills contribute to effective engagement with emerging technologies.

When the mean scores of the total score of metaverse and its sub-dimensions were compared with the students' having heard the concept of metaverse before, a significant difference was found in the technology sub-dimension, lifestyle sub-dimension and metaverse total score sub-dimension. The mean score was found to be higher in those who had heard the concept of metaverse before. This can be interpreted as an expected situation that students who have heard the definition of metaverse before have higher levels of knowledge. In a study (16), it was found that those who had heard the concept of metaverse before had a significantly higher difference in all sub-dimensions except the social sub-dimension and in the total score. In parallel with this study, Statista (22) found that 14% of adults knew the concept of metaverse very well, 31.0% had heard of metaverse but had no idea about the concept, and 31% had never heard of metaverse. In a similar study conducted by Sayımer and Küçüksaraç (24) with communication faculty students, 52.0% of the students stated that they knew about augmented reality applications, and Uygur et al. (25) stated that 50.9% of the candidates had heard of augmented reality applications in their study with prospective teachers. In a study conducted by Talan and Kalınkara (26) with second-year students studying in the department of computer engineering, it was found that 70.6% of the students had not used metaverse technology before. Similarly, in the study conducted by Turan et al. (17) it was determined that the mean scores of the digitalization and lifestyle sub-dimensions and total scores of those who had heard of the concept of metaverse before were significantly higher. The positive association between having heard the concept of the metaverse before and higher knowledge levels aligns with the general principle that prior exposure fosters understanding. This finding supports the idea that early education or awareness campaigns about the metaverse could positively impact students' knowledge and attitudes.

The mean scores of the technology, lifestyle sub-dimension and total metaverse sub-dimension of the students who had previously experienced virtual reality and virtual reality through games were found to be significantly higher. This situation can be interpreted as an expected situation that students who have experienced virtual reality, which is an important component of the metaverse technology, and this reality through games, have a high level of knowledge about the metaverse. Those who have engaged with similar technologies may have a more solid foundation for understanding the metaverse. This supports the idea that hands-on experience with related

technologies contributes to a more positive attitude and higher awareness.

Conclusion

In this study, the metaverse knowledge, attitudes and awareness characteristics of students studying in the faculty of health sciences of a university were examined and it was determined that metaverse knowledge, attitudes and awareness levels were higher in: those who lived in dormitories, those who were married, those who defined their income level as high, 4th grade students, nursing and audiology department students, those who stated that they had heard the concept of metaverse before, those who experienced virtual reality and virtual reality games, and students who defined their internet usage skills as high. The reason why students' knowledge, attitude and behavior levels about metaverse are variable may be due to the fact that many students have not yet experienced the metaverse application since the concept of metaverse is still developing. Metaverse applications are not yet widely used in health education and research on its effectiveness in the learning-teaching process has only recently begun. With the changing and developing technology, it is predicted that young generations born into this technology will use the concept of metaverse more advanced and widespread in the future, and as the researches revealing the benefits of this concept on students in the field of health education increase, it will become more widespread in many fields.

In this context;

- Providing health education professionals with the opportunity to offer students the opportunity to experience this technology by including topics that include the concept of metaverse in courses within the university curriculum,
- Since metaverse is a concept that is just beginning to be explored, in future studies, determining metaverse knowledge, attitude and awareness levels in larger samples and students studying in different departments,
- Examining the causes of students' metaverse attitudes and behaviors using different models,
- Examining the relationships of students' metaverse attitudes and behaviors with different concepts that may affect technology addiction, academic achievement, social support perception, happiness and fear,
- Researchers examine how these findings compare or differ from similar studies, taking into account cultural, educational, and technological contexts,
- Conducting research with experimental design within the scope of metaverse supported education modules or similar metaverse online courses,
- Additionally, it explores the potential implications of these findings for curriculum development, educational strategies, and future research directions at the intersection of health sciences and metadata,
- Multidisciplinary projects and collaborations with research groups in fields involving different technological disciplines are recommended.

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Conflict of Interest

There is no conflict of interest between the authors.

Ethics approval

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Availability of data and material

Research data is available upon request.

Authors' Contributions

SAI: Design, data collection, analysis and writing.

INK: Design, data collection, and writing.

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