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# The relationship between virtual reality attitudes and metaverse in sports sciences students

**Mustafa KOÇ[1], Efecan TEZCAN[1], Zeynep Hazal ULUTAŞ [1], Mustafa AYHAN[1]**

[1]Gümüşhane University, High school of Physical Education and Sports, Gümüşhane, Türkiye

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**Abstract**

Virtual reality affects teaching and learning processes in the classroom. Metaverse is a simulated virtual environment that includes virtual reality and augmented reality. The aim of this research is to determine the attitudes of Sports Science students towards the concepts of virtual reality and metaverse and to reveal the relationship between these two scales. The sample of the research consists of students (n=205) studying at Gümüşhane University School of Physical Education and Sports (Türkiye), determined by the easily accessible case sampling method. Data collection consists of questions about students' gender, age, income, virtual reality or metaverse experience, and time spent on the internet. The Virtual Reality Attitude Scale and the Metaverse Scale were used. The study, which was handled from a quantitative perspective, used the relational-scanning method. Data were collected through face-to-face surveys. SPSS 29.0 package program was used to analysys. Independent Samples T Test was used for gender, age and experience, and One-Way Analysis of Variance for Independent Samples (ANOVA) was used for income and time spent on the internet. Analysis results; It was interpreted with test statistics and p values, significance was based on $p \leq 0.05$. The eta-squared formula was used to calculate the effect size. In evaluating the relationship between the two scales, Pearson Product Moment Correlation Coefficient was used and the significance value was accepted as 0.05. As a result, there were no differences in attitudes towards virtual reality and metaverse applications according to gender, personal income and time spent on the internet during the day. Having previously experienced virtual reality or metaverse revealed significant differences in both scales. Having the experience positively affects the attitude towards the concepts of virtual reality and metaverse. Finally, the relationship between the used scales was evaluated and it was seen that these two concepts moderately affected each other.

**Keywords:** Virtual reality, metaverse, technology, education, physical education

## *Spor bilimleri öğrencilerinin sanal gerçeklik tutumları ile metaverse arasındaki ilişki*

***Öz***

*Sanal gerçeklik, sınıf içinde öğretme ve öğrenme süreçlerini etkiler. Metaverse; sanal gerçeklik ve arttırılmış gerçekliği barındıran simüle edilmiş bir sanal ortamdır. Bu araştırmanın amacı spor bilimleri öğrencilerinin sanal gerçeklik ve metaverse kavramlarına yönelik tutumlarını belirlemek ve bu iki ölçek arasındaki ilişkinin ortaya koyulmasıdır. Araştırmanın örneklemini kolay ulaşılabilir durum örneklemesi yöntemiyle belirlenen 2023-2024 eğitim öğretim yılında Gümüşhane Üniversitesi Beden Eğitimi ve Spor Yüksekokulunda (Türkiye) öğrenim gören öğrenciler (n=205) oluşturmaktadır. Veri toplama da öğrencilerin "cinsiyet, yaş, gelir, sanal gerçeklik veya metaverse deneyim durumu ve internette geçirilen saat" ile ilgili durumları sorularından oluşmaktadır. Sanal Gerçeklik Tutum Ölçeği ve Metaverse Ölçeği kullanılmıştır. Bu çalışmada nicel bir bakış açısı olan ilişkisel tarama yöntemi kullanılmıştır. Veriler yüz yüze anketlerle toplanmıştır. Verilerin analizi için 29.0 paket programı kullanılmıştır. Cinsiyet, yaş ve deneyim için Bağımsız Örneklemler T Testi, gelir ve internette geçirilen zaman için için Tek Yönlü Varyans Analizi (ANOVA) kullanılmıştır. Analiz sonuçları p değerleri ile yorumlanmış, anlamlılık $p \leq 0,05$ kabul edilmiştir. Etki büyüklüğünün belirlenmesi için eta-kare formülü kullanılmıştır. İki değişken arasındaki ilişkinin değerlendirilmesinde Pearson Moment çarpımı Korelasyon Katsayısı kullanılmış ve anlamlılık değeri 0,05 olarak kabul edilmiştir. Sonuç olarak cinsiyet, kişisel gelir ve gün içerisinde internette geçirilen saate göre sanal gerçeklikle metaverse kayramlarına olan tutumlarda herhangi bir farklılık görülmemiştir. Daha önce sanal gerçeklik veya metaverse deneyiminde bulunmak her iki ölçekte de anlamlı farklar ortaya koymuştur. Deneyimde bulunmanın sanal gerçeklik ve metaverse kavramlarına olan tutumu olumlu etkilemektedir. Son olarak kullanılan ölçekler arası ilişki değerlendirilmiştir ve bu iki kavramın birbirini orta derece etkiledikleri görülmüştür.*

***Anahtar Kelimeler:*** *Sanal gerçeklik, metaverse, teknoloji, eğitim, beden eğitimi*

**Sorumlu Yazar/ Corresponded Author**: Efecan TEZCAN, **E-posta/ e-mail:** efecantezcan@gmail.com

## INTRODUCTION

"TDK" defines the word "virtual" as something that has no place in reality and is designed in the mind, it defines the word "reality" as an object or quality whose existence cannot be denied. New Universal Unabridged Dictionary (1989) defines virtual as "having in essence or effect but not in reality." At the same time, Webster's defined the word "reality" as the state or quality of being real (Sherman & Craig, 2002). This space is accompanied by wearable devices such as gloves, glasses and headphones. Virtual reality as a real-time environment created by users' computers and containing many emotions. Virtual reality, which is used in many areas such as sports and health, is also adopted by users as a recreational activity (Demirezen, 2019).

Virtual reality emerges as a heterogeneous field of study. Therefore, it is difficult to pinpoint where it started. However, when we look at the studies, it is seen that virtual reality is a stereoscope device invented by Sir Charles Wheatstone (1838). Wheatstone made 2-dimensional objects appear 3-dimensional. Simulators, headsets or glasses made later laid the foundations of virtual reality technology (Melinda & Widjaja, 2022).

Virtual reality; It has become a main subject where branches from a wide variety of disciplines, such as electronics, mechanics, optics and computer technologies, as well as physiotherapists and neurology, which studies the human perception system, come together (Ferhat, 2016). For example; The "I'm in the Classroom Too" project, conducted in Türkiye and examining how virtual reality applications can be used in education and their potential effects on students, offers an educational solution for home-schooled students who are physically and socially out of school (Demir & Kandemir, 2020). In physical education, online education, multimedia, mobile application and virtual reality technology have been used with different methods and strategies to develop skills related to branches, provide health-related information, support the participation of students with special needs in classes, teach sports rules, exercise and give motor skills courses (Yılmaz et al., 2022).

The developing technology in recent years, new learning styles have begun to be used. Mobile applications have become a part of students' daily lives through devices such as smartphones and tablets (Purnama et al., 2021). With the introduction of virtual reality technology into homes in 2016, the use of this technology in education has become even more important. Virtual technology can increase student engagement and motivation by providing students with interactive and immersive experiences (Melinda & Widjaja, 2022). Recent developments make VR (virtual reality) and AR (augmented reality) technology more

accessible, allowing students to easily access this technology. Additionally, it allows students with disabilities to access and interact with virtual environments more easily than other students (Jung & Park, 2022).

Virtual reality is a computer technology that tracks the user's position and movements and provides feedback to the user through at least one sense organ (Sherman & Craig, 2002) This technology makes the user feel as if they are in an artificial and three-dimensional world and allows them to receive sensory reactions as in the real world (Jerald, 2015). In virtual environments, users experience the feeling of being in that place and existing in a different physical environment (Erkılıç & Dönmez, 2020).

Innovations in the field of information and communication technology provide new learning opportunities by facilitating learning processes and become an important part of learning environments. The integration of technology into the classroom significantly impacts teaching and learning processes (Bower, et al., 2020). In particular, the development of virtual reality technology increases the capacity to deliver immersive simulated learning experiences. VR provides students with interactive experiences by simulating real-world or fictional situations with three-dimensional graphics. In this way, students can explore and interact with simulated environments in which they perceive their bodies to be present. Virtual reality helps students gain new skills by creating interactive and interesting learning scenarios that suit their needs (Karaoglan-Yilmaz, et al., 2023).

Süleymanoğulları et al. (2022) state that "Advances in computer hardware have led to the emergence of new applications in the field of software such as artificial intelligence, virtual reality, augmented reality, internet of things, blockchain, cloud and big data. With the rapid development in gaming culture, the spread of the internet and the use of wearable technologies, the concept of metaverse has entered our lives. Commercial businesses and individuals have begun to take part in the metaverse world by using wearable technologies. These developments have led to an increase in innovations related to the metaverse…".

Metaverse is a three-dimensional and human universe brought to life with technologies such as virtual reality (VR) and augmented reality (AR). The concept of virtual and augmented reality are two central and critical components to the metaverse. (Yıldırım, 2022). The metaverse is a post-reality world with multiple users, persistent and continuous, combining digital virtuality with physical reality (Mystakidis, 2022). The word metaverse is used in Turkish as metauniverse or virtual universe (Çelik, 2022). Metaverse refers to the virtual world

in which a person acts as an avatar, his alter ego, which becomes the active subject in the Metaverse. The avatar in question has political, economic, social and cultural movements (Park & Kim, 2017). The term Metaverse first appeared in the comic book Snow Crash, written by Neal Stevenson and published in 1992 (Mystakidis, 2022). Sparkles (2021) stated that, closer to today, there was a virtual universe called OASIS in the novel and movie "Ready Player One" (Damar, 2021).

Metaverse fully integrates with various technologies. Artificial intelligence, augmented reality, 5G and wearable devices create user and avatar connection (Wang et al., 2022). Virtual reality and Metaverse are two separate concepts that are interconnected. While virtual reality's introduction to us dates back to a more distant time, the Metaverse appears later than that. Today, companies such as Amazon, Facebook and Netflix have supported this new formation and taken their place. There are many examples today, such as avatars created on Facebook (Meta), creating your own universe in new era games, or organizing virtual meetings (Lee et al, 2021).

Hwang and Chien (2022) determined the advantages of using the metaverse in education as; providing students with experience in environments that may be risky or dangerous in the real world, offering experiences that they cannot access in the real world in a virtual environment, enabling them to learn subjects that require long-term participation and practice, realizing things that cannot be done in the real world due to cost or material shortages in a virtual environment, encouraging them to think alternatively and make initiatives, enabling them to experience events from different perspectives or roles, enabling them to interact and collaborate with people they would not have the opportunity to work with in the real world, and discovering students' potential or higher-order thinking skills with complex and original tasks. According to Zhan et al. (2022), high-speed networks and analytical technologies make educational environments in the metaverse more fluid and low-latency. These technologies allow them to effectively store and share student data, and analytical tools analyze students' behavior and performance to provide personalized resources. Modeling and processing technologies create detailed and rich educational spaces. Interaction technologies provide discovery, collaboration, and real-time feedback. Blockchain secures student data and prevents problems such as fraud. Smart wearable devices provide seamless transition between the real and virtual worlds.

The aim of the research is to examine the relationship between these two concepts, which are a new formation in our age and constantly evolving. It is aimed to look at the attitudes of individuals after being introduced to virtual reality and their relationship with the Metaverse. In addition, it was aimed to determine how close users in the field of sports sciences are to the concept of virtual reality and how much knowledge they have about the metaverse system. The hypotheses of this study are that experiencing virtual reality or metaverse may cause a positive attitude towards these two concepts and that there may be a strong relationship between these two concepts in this study.

## METHOD

### Research group (population-sample)

The sample of the research consists of students (n=205) studying at Gümüşhane University School of Physical Education and Sports (Türkiye) in the 2023-2024 academic year, 47 students from the physical education and sports teaching department, 82 students from the coach education department, and 76 students from the sports management department participated, determined by the easily accessible case sampling method, one of the non-probability sampling methods. Easily accessible situation sampling provides speed and practicality to the researcher; in this method, the researcher selects the situation that is close and easy to access (Yıldırım & Şimşek, 2015). In order to generalize the research results regarding the universe, a minimum of 10% sample is needed in descriptive studies and 20% in small universes. It is stated that at least 30 elements are required in correlation studies and causal comparisons. In this context, it is generally stated that sample sizes greater than 30 and less than 500 at a 5% level of certainty are sufficient for many studies (Gay, 1987). Institutions that provide education in sports sciences can use virtual reality and metaverse applications to provide students with the opportunity to apply theoretical knowledge in practice. Virtual environments can help students learn and apply sports techniques. For this reason, physical education and sports students were preferred.

### Data collection tools

Personal Information Form: It consists of questions about students' gender, age, personal income, virtual reality or metaverse experience, and hours spent on the internet. Virtual Reality Attitude Scale (VRTS): VRSS is a 9-question scale developed by Karaoglan-Yilmaz et al., (2023) in order to determine the participants' approaches to the concept of virtual reality in the form of a 5-point Likert. As the score obtained from the scale increases, the attitude towards virtual reality increases. The Cronbach's alpha coefficient for the attitude measurement

instrument was 0.92. Second, third and fourth year students at the Faculty of Science, Faculty of Education, Faculty of Engineering and Faculty of Health Sciences of a state university in Türkiye, who used virtual reality applications for educational purposes, participated in the study. The research was conducted with three different participant groups. The first group included 171 undergraduate students. Exploratory factor analysis was performed on the data obtained from this group. The second participant group included 198 undergraduate students. Confirmatory factor analysis was performed on the data obtained from this group. In addition, Cronbach's alpha reliability coefficients were calculated using all the data obtained from the first and second groups (n = 369) and item analyzes were performed. Test-retest reliability was examined using the data of the third group (n = 31).

Metaverse Scale (MVS): MVS is a 15-question scale in the form of a 5-point Likert scale developed by Süleymanoğulları et al. (2022) to determine the participants' approaches to the concept of metaverse. As the scores obtained from the scale increase, the level of knowledge, attitude and awareness regarding the concept of metaverse also increases. The Cronbach's alpha coefficient for the attitude measurement instrument was 0.81. Survey forms covering the Metaverse scale were administered to students studying at various levels at a state university. Students (n=330) who participated in the first application filled out the scale and exploratory factor analysis was performed. As a result of the explanatory factor analysis, a 15-item Scale was obtained, then the Scale was applied to a different group of 253 people and a confirmatory factor analysis was performed. Cronbach Alpha coefficient was calculated to prove that the entire scale was reliable.

**Data collection/processing method**

The study, which was handled from a quantitative perspective, used the relational-scanning method. This is a scanning approach that aims to reveal the entity that causes the change between two or more variables with the relational scanning model. It reveals the change and direction of these variables together, as well as how change occurs in situations (Karasar, 2011). Measurement is an activity carried out to express the current situation quantitatively and compare it with predetermined standards. This is usually done through surveys or data collection methods. Questionnaires or research protocols prepared for measurement are called scales. In this study, data was collected using different scales (Sayım, 2017).

**Data analysis**

Data were collected through face-to-face surveys in accordance with the consent of the participants and their voluntary participation interest, after correspondence with the relevant

institution. SPSS 29.0 package program was used to evaluate the data obtained in this study. It was determined whether the data showed a normal distribution using the Kolmogorov-Smirnov normality test (Büyüköztürk, 2012) and by using Skewness and kurtosis values (Tabachnick & Fidell, 2013). Since the sample groups were more than 50, the Kolmogorov-Smirnov test was taken into account in normality tests, and the significance value was accepted as 0.05 (Kilmen, 2020). It was accepted that the data was in accordance with normal distribution if the skewness and kurtosis values were within ±1.5 (Tabachnick & Fidell, 2013). The frequency values of the participants' information are given in a table.

Independent Samples T Test was used for gender and experience variables, and One-Way Analysis of Variance for Independent Samples (ANOVA) was used for age, income and time spent on the internet (Fraenkel et al., 2012). Analysis results; It was interpreted with test statistics and p values, significance was based on $p \leq 0.05$ (Kilmen, 2020). The eta-squared ($\eta 2$) formula was used to calculate the effect size of significant results (Cohen, 1988; Gravetter & Wallnau, 2007). In evaluating the relationship between the two scales, Pearson Product Moment Correlation Coefficient was used and the significance value was accepted as 0.05 (Kilmen, 2020).

## FINDINGS

**Table 1. Frequency table of participants' information**

| Variable | Groups | n | % |
|---|---|---|---|
| Gender | Male | 109 | 53.2 |
| | Female | 96 | 46.8 |
| Age range | 18-21 | 158 | 77.1 |
| | 22-26 | 47 | 22.9 |
| Income | 500-1500 | 88 | 42.9 |
| | 1501-2500 | 47 | 22.9 |
| | 2501-3500 | 31 | 15.1 |
| | 3501+ | 39 | 19.0 |
| Experience | Yes | 38 | 18.5 |
| | No | 167 | 81.5 |
| Hour | 1-3 | 51 | 24.9 |
| | 4-6 | 66 | 32.2 |
| | 7+ | 88 | 42.9 |

Table 1 gives the frequency table of the participants' information. Accordingly, 53.2% of the participants were male and 46.8% were female, and a total of 205 participants were reached. When the age ranges are examined, 77.1% of the participants are between the ages of 18-21, 22.9% are between the ages of 22-26. When the personal income of the students is examined, 42.9% have an income of 500-1500 TL, 22.9% have an income of 1501-2500 TL, 15.1% have an income of 2501-3500 TL, and 19.0% have an income of 3501 TL and above. 18.5% of the participants had experienced virtual reality or metaverse, 81.5% had not. 24.9%

of the participants spend 1-3 hours on the internet a day, 32.2% spend 4-6 hours on the internet, and 42.9% spend 7 hours or more on the internet.

**Table 2. Kolmogorov-Smirnov Normality Test results and kurtosis-skewness values of the data**

| Variable | Scale | | Kolmogorov-Smirnov Normality Test | | | Skewness-Std. Mistake | Kurtosis-Std. Mistake |
|---|---|---|---|---|---|---|---|
| | | | *Statistics* | *df* | *p* | | |
| Age | VRAS | 18-21 | 0.043 | 158 | 0.032 | -0.835<br>0.344 | 0.864<br>0.386 |
| | | 21-26 | 0.004 | 47 | 0.003 | -0.704<br>1.465 | 0.432<br>0.122 |
| | MVS | 18-21 | 0.061 | 158 | 0.02 | -0.568<br>0.123 | 1.114<br>0.357 |
| | | 21-26 | 0.091 | 47 | 0.035 | -0.422<br>0.356 | 0.258<br>0.367 |
| Gender | VRAS | Male | 0.093 | 109 | 0.021 | -0.946<br>0.231 | 1.961<br>0.459 |
| | | Female | 0.113 | 96 | 0.004 | -0.894<br>1.757 | 0.246<br>0.488 |
| | MVS | Male | 0.104 | 109 | 0.005 | -0.969<br>0.231 | 1.322<br>0.459 |
| | | Female | 0.073 | 96 | 0.200 | -0.510<br>0.246 | 0.407<br>0.488 |
| Experience | VRAS | Yes | 0.143 | 38 | 0.049 | 0.098<br>0.383 | -0.961<br>0.750 |
| | | No | 0.102 | 167 | <0.001 | -0.974<br>0.188 | 1.268<br>0.374 |
| | MVS | Yes | 0.122 | 38 | 0.168 | 0.098<br>0.383 | -1.115<br>0.750 |
| | | No | 0.092 | 167 | 0.001 | -0.844<br>0.188<br>0.257 | 1.430<br>0.374<br>0.508 |

VRAS: Virtual Reality Attitude Scale MVS: Metaverse Scale

The information obtained from the participants and the data obtained from the scales were evaluated according to normality, Kolmogorov-Smirnov normality test and kurtosis and skewness values, since the sample number was greater than 50. Skewness and kurtosis values of all values are in the range of ±1.50 and show a normal distribution (Tabachnick & Fidell, 2013).

**Table 3. Independent Samples T Test results of VRAS and MVS according to gender and experience**

| Variable | | Scale | N | X | sd | *t* Test | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | *t* | *sd* | *p* |
| Age | 18-21 | VRAS | 158 | 3.50 | 0.650 | 0.314 | 203 | 0.777 |
| | 21-26 | | 47 | 3.54 | 0.729 | | | |
| | 18-21 | MVS | 158 | 3.60 | 0.714 | 0.293 | 203 | 0.770 |
| | 21-26 | | 47 | 3.63 | 0.671 | | | |
| Gender | Male | VRAS | 109 | 3.52 | 0.653 | 0.209 | 203 | 0.835 |
| | Female | | 96 | 3.50 | 0.687 | | | |
| | Male | MVS | 109 | 3.43 | 0.579 | 0.185 | 203 | 0.853 |
| | Female | | 96 | 3.41 | 0.545 | | | |
| Experience | Yes | VRAS | 38 | 3.73 | 0.539 | 2.254 | 203 | 0.250 |
| | No | | 167 | 3.46 | 0.685 | | | |
| | Yes | MVS | 38 | 3.61 | 0.477 | 2.357 | 203 | 0.019 |
| | No | | 167 | 3.38 | 0.572 | | | |

VRAS: Virtual Reality Attitude Scale MVS: Metaverse Scale

Table 3 shows the Independent Samples T Test results according to age, gender and experience. As a result of the analysis, no significant difference was found according to gender and age in both scales ($p>0.05$). According to experience, significant differences were found in both scales ($p>0.05$). For VRAS, a significant difference was found between the score of those who had previous virtual reality or metaverse experience ($X = 3.73$, $sd = 0.53$) and the score of those who had not ($X = 3.46$, $sd = 0.68$) ($t = 2.254$, $p<0.05$, $\eta2=0.02$). Accordingly, the effect of experience on VRAS scores is significant and low ($p<0.05$, $\eta2=0.02$). For MVS, a significant difference was found between the score of those who had previous virtual reality or metaverse experience ($X = 3.61$, $sd = 0.47$) and the score of those who had not ($X = 3.38$, $sd = 0.57$) ($t = 2.357$, $p<0.05$, $\eta2=0.02$). Accordingly, the effect of experience on MVS scores is significant and low ($p<0.05$, $\eta2=0.02$).

**Table 4. ANOVA results of VRAS and MVS according to age, income and internet usage hours**

| Variable | Scale | | N | X | sd | f | p | Difference |
|---|---|---|---|---|---|---|---|---|
| Income | VRAS | 500-1500 | 88 | 3.56 | 0.703 | 0.682 | 0.564 | None |
| | | 1501-2500 | 47 | 3.40 | 0.763 | | | None |
| | | 2501-3500 | 31 | 3.47 | 0.433 | | | None |
| | | 3500+ | 39 | 3.55 | 0.619 | | | None |
| | MVS | 500-1500 | 88 | 3.43 | 0.642 | 0.196 | 0.899 | None |
| | | 1501-2500 | 47 | 3.44 | 0.547 | | | None |
| | | 2501-3500 | 31 | 3.35 | 0.486 | | | None |
| | | 3500+ | 39 | 3.42 | 0.447 | | | None |
| Hour | VRAS | 1-3 | 51 | 3.48 | 0.747 | 0.911 | 0.404 | None |
| | | 4-6 | 66 | 3.60 | 0.697 | | | None |
| | | 7+ | 88 | 3.45 | 0.593 | | | None |
| | MVS | 1-3 | 51 | 3.35 | 0.629 | 1.181 | 0.309 | None |
| | | 4-6 | 66 | 3.38 | 0.561 | | | None |
| | | 7+ | 88 | 3.49 | 0.519 | | | None |

VRAS: Virtual Reality Attitude Scale MVS: Metaverse Scale

Table 4 shows the ANOVA results of VRAS and MVS scores according to age, personal income and hours spent on the internet during the day. Accordingly, no significant difference was found in the relevant variables in both scales (p>0.05).

**Tablo 5. Correlation table of VRAS and MVS**

| | **X** | **sd** | **VRAS-MVS** | |
|---|---|---|---|---|
| | | | ***p*** | ***r*** |
| VRAS | 3.51 | 0.668 | <0.001 | 0.314 |
| MVS | 3.42 | 0.562 | | |

VRAS: Virtual Reality Attitude Scale MVS: Metaverse Scale

In Table 5, the Pearson Product Moment Correlation Coefficient of the SGT and MVS is given and the relationship between both scales is calculated. Accordingly, there is a positive and moderately significant relationship between the scales (r=0.314, p<0.001).

## DISCUSSION AND CONCLUSION

The aim of this research was to determine the attitudes of School of Physical Education and Sports students towards the concepts of virtual reality and metaverse and to reveal the relationship between these two scales. In this context, as a result of the statistical analysis, no significant difference was found according to age and gender in both scales (p>0.05). Having previously experienced virtual reality or metaverse revealed significant differences in both scales (p>0.05). The effect of previous virtual reality experience on VRS and MVS scores is significant and low (p<0.05, η2=0.02). When SGT and MVS scores were evaluated according to personal income and hours spent on the internet during the day, no significant difference was found in both scales. Finally, the relationship between the scales used was evaluated and a positive and moderately significant relationship was found between the scales (r=0.314, p<0.001).

Looking at the literature, Yeşiltaş (2019) used VRAS along with different scales in his study investigating secondary school students' academic achievements, cognitive levels and attitudes towards virtual reality through virtual reality applications. As a result, it was observed that the cognitive levels of students participating in virtual reality applications improved and they developed positive attitudes towards virtual reality. In a similar study, the effect of augmented reality (AR) applications on primary school students' motivation for learning science and their attitudes towards augmented reality applications was examined. According to the results obtained, it was seen that AR applications improved motivation towards learning

science and attitudes towards these applications positively. In addition, as a result of students' answers to open-ended questions, it was stated that AR applications make the lesson more enjoyable and positively affect students' participation (İzgi-Onbaşılı, 2018). Yilmaz et al. (2019) examined the attitudes of experiencing virtual reality applications, gender and age towards the concept of virtual reality.

Similar to this study, in a study investigating the metaverse knowledge levels of physical education and sports teaching students, it was found that, unlike our findings, the scores men received from the metaverse scale were significantly higher than those of women. Similar to the findings of this study, no significant relationship was found in terms of the age variable and the metaverse knowledge levels of teacher candidates (Savaş et al., 2022). Turan et al., (2023), in their study to determine the metaverse knowledge levels of physical education teachers, found no significant differences in the comparison of metaverse knowledge levels according to the gender and length of service of the participants, similar to our findings, but they found significant differences according to the age variable. Similarly, in a study where the metaverse scale was applied to sports science students, no significant difference was found according to the gender variable. In addition, it was shown that those who had metaverse experience had higher knowledge and attitude scores than those who did not. These findings support our findings (Görkem & Başarmak, 2024).

Similar to the findings of this study, there was no significant difference in the age of the students and their knowledge and interest in virtual reality, but when the gender variable was examined, it was concluded that men were more interested in virtual reality than women. In a study designed similar to this study but with different results, it was aimed to reveal the Metaverse awareness of the students of the Faculty of Sports Sciences and a significant difference was observed according to the gender variable. The scores of women on the scale were found to be higher than men. According to the daily time spent on the internet, it has been observed that Metaverse awareness levels increase as the time spent on the internet increases (Çakır et al., 2022). In a study conducted on virtual reality, the effects of desktop virtual reality simulations on learning were investigated using motivation, self-efficacy, and genetic information. The study was conducted on 199 university students who learned with desktop virtual reality simulations in a medical genetics course. As a result, it was concluded that desktop virtual reality simulations are effective and usable and can be beneficial for students (Makransky & Petersen, 2019). In addition, a meta-analysis conducted in 2014 showed that virtual reality technology-based instruction (games, simulation, virtual worlds) in higher

education environments is effective in improving learning outcome gains (Merchant et al., 2014).

As a result, when we look at this study and the literature, it can be seen that individuals who have previously experienced virtual reality or metaverse have positive attitudes towards these two concepts, which have entered our lives in recent years and are the latest products of technology. More studies are needed to examine attitudes towards these concepts according to time spent on the internet, individuals' personal income, gender and age. It is thought that the sports-educational sciences community should use this field more actively in order to transfer what is taught to real life.

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| **KATKI ORANI** *CONTRIBUTION RATE* | **AÇIKLAMA** *EXPLANATION* | **KATKIDA BULUNANLAR** *CONTRIBUTORS* |
|---|---|---|
| Fikir ve Kavramsal Örgü *Idea or Notion* | Araştırma hipotezini veya fikrini oluşturmak *Form the research hypothesis or idea* | Efecan TEZCAN Mustafa AYHAN |
| Tasarım *Design* | Yöntem ve araştırma desenini tasarlamak *To design the method and research design.* | Mustafa KOÇ |
| Literatür Tarama *Literature Review* | Çalışma için gerekli literatürü taramak *Review the literature required for the study* | Mustafa AYHAN Zeynep Hazal ULUTAŞ |
| Veri Toplama ve İşleme *Data Collecting and Processing* | Verileri toplamak, düzenlemek ve raporlaştırmak *Collecting, organizing and reporting data* | Zeynep Hazal ULUTAŞ Mustafa KOÇ |
| Tartışma ve Yorum *Discussion and Commentary* | Elde edilen bulguların değerlendirilmesi *Evaluation of the obtained finding* | Efecan TEZCAN Zeynep Hazal ULUTAŞ |

**Destek ve Teşekkür Beyanı/ *Statement of Support and Acknowledgment***

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**Etik Kurul Beyanı/ *Statement of Ethics Committee***

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