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The Effect of Metaverse Techniques on the Practice of Some Sport Skills in the Context of Simulation, the Language of Learning

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Abstract: This study aimed to investigate the impact of metaverse techniques on the development of sport skills through simulation-based training. The study focused on exploring the effect of metaverse techniques, including augmented reality, spatial computing, data science, virtual reality, running skill, bicycle, and swimming, on the improvement of exercise skills. The research utilized a pre-test and post-test design, with measurements taken before and after the implementation of metaverse techniques, The results revealed significant improvements in exercise skills across various variables. Augmented reality demonstrated a large effect size (Cohen's d = 10) and a percentage of improvement of 76.92%, indicating a substantial enhancement in exercise skills. Spatial computing showed a moderate effect size (Cohen's d = 3.6) and a 72% improvement rate, suggesting noticeable progress in exercise skills through the use of metaverse techniques. Data science exhibited a moderate effect size (Cohen's d = 4.38) with a percentage of improvement of 45.45%, indicating a moderate impact on exercise skill development, Virtual reality's effect size could not be calculated due to the absence of the standard deviation for the tribal measurement. However, the percentage of improvement was found to be 161.8%, suggesting a substantial enhancement in exercise skills. The effect size and percentage of improvement for running skill and bicycle could not be accurately determined without the standard deviation for the tribal measurement ,Swimming demonstrated a large effect size (Cohen's d = 14.57) and a percentage of improvement of 171.21%, indicating significant progress in exercise skills ,Overall, the findings indicate that the use of metaverse techniques has a positive impact on the development of exercise skills, with varying levels of effectiveness across different variables. This study contributes to the understanding of the potential benefits of metaverse techniques in enhancing exercise skills through simulation-based training.

Keywords: *Metaverse, augmented reality, exercise skills, virtual reality, metaverse technology*

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INTRODUCTION

Most countries have witnessed a dimension of education through the online programs and conference platforms. However, these program platforms have failed to reduce indulgence and repeat the semester experience. Metaverse currently emerging technologies are dealing with many of these restrictions by providing mixed digital material environments (Chen et al., 2021).

Metaverse techniques as a useful solution appear by integrating the latest technologies such as virtual reality (VR), augmented reality (AR), artificial intelligence and cloud computing to make educational activities more attractive (Lee et al., 2021).

We focus on the structure of the metaphors system to achieve in the actual time for a large number of participants and activities through physical learning spaces (the classroom of mixed reality) and virtual (VR platform from dimension). Our proposal tries to convert traditional material classroom into a virtual physical electronic space as a new social network of learners and teachers connected to an unprecedented scale (Zhang, Liu, Kang, & Al-Hussein, 2020).

The exercise and sports industry is a huge global market that is constantly developing. As PCBB, Goldman Sachs expected that Metaverse will be an opportunity of $8 trillion, recently witnessed the emergence of new technologies, such as Metaverse, to change the way fans interact with sports. Metaphors will change the way we watch and play sport, and will deeply affect how to organize the sports industry (Sports, 2022).

Asim (2022) mentioned: Metaverse is a post -reality world, in which material reality is integrated with virtual environments with a continuous network that includes continuous and multiple people, and it contains world of open play and is based on virtual reality VR and AR, and users are represented in symbolic images that are done The interaction between them in the actual time and with a ventured feeling that users live and calls these symbols AVATAR .

Jeon and Jung (2021) is proposed that the capabilities of Metaverse as a new educational environment through the new social communication space; a higher degree of freedom to create educational design and participation; and to provide new experiences and high indulgence through virtual representation Teachers must design students to solve problems or implement projects cooperatively and creatively; Metaverse educational platforms that prevent misuse of student data.

Ghazi (2022) confirms that Metaverse techniques are simulating the sports person and practicing sports skills, which are intended through the lesson of physical education or through the traibi attitudes to learning for these situations by 80%of the learning rate.

Azab and Ghazi (2023) agrees that the newly created metaphors technology allows the virtual interaction in a more advanced way, the person feels as if he has moved to another world that lives with him, that the technology of Metaverse provides a great way to interact with others around the world, where any can A person anywhere put the virtual meta glasses attached to it to communicate with others face to face unlike e -mail and other Internet connections.

Study background

The studies background emphasizes the benefits of using Metaverse in sports practice, such as direct interaction, cost reduction in training halls, and the ability to create educational environments with higher standards than the real world, The study aims to utilize Metaverse technology to simulate and practice certain sports skills. The researcher adopts a descriptive approach by reviewing relevant literature and theoretical studies, as well as an experimental approach through the application and analysis of study variables, The study focuses on the application of Metaverse techniques, such as virtual reality and augmented reality, to enable the practice of sports skills like running, cycling, and swimming. The independent variable is Metaverse techniques, while the dependent variable is the practice of sports skills, The study aims to answer the research question:

What are the Metaverse techniques used in the work environment for sports practice for some skills under study?

Terminology of study :

Metaverse: It is a post -reality world, in which material reality is combined with virtual environments with a continuous network that includes continuous and multiple people, and the world of open play contains virtual reality VR and AR, AR, and users are represented in symbolic images that are interact Users live and are called Avatar (Mystakidis, 2022).

PROCEDURES

Based on the information provided in the introduction, it is difficult to determine the specific inductive method used in the study. However, we can infer that the study may utilize a combination of qualitative and quantitative research methods. The qualitative aspect of the study may involve exploring the experiences, perceptions, and attitudes of the participants towards the use of Metaverse in education and sports. This could be done through interviews, focus groups, or surveys to gather subjective data. The quantitative aspect of the study may involve collecting objective data related to the impact of Metaverse on educational activities and sports performance. This could involve measuring variables such as learning outcomes, engagement levels, and improvement rates in sports skills. The sample size of 50 individuals suggests that the study may employ a small-scale quantitative approach. Overall, the study may employ an inductive research approach by collecting and analyzing data to generate insights and theories regarding the capabilities and potential impact of Metaverse as a new educational environment and its application in sports.

Through the study, the special standards of Metaverse applications were directed by designing the work environment to exercise (running - biking - swimming) for Metaverse applications: (augmented reality, spatial computing, data science, virtual reality).

Augmented Reality: A sports activity that creates unrealistic information by installing virtual objects or facades on the physical environment that the user recognizes. Through an explanation of the educational and skill steps of the skill under study (Hwang & Chien, 2022).

Data Science: Sports activities in a virtual space that allows users to register people with information, emotions and behaviors directly to make my data content about that skill (Egliston & Carter, 2021).

Virtual Reality: A virtual sports world that expands real sporting activities. It builds alternative virtual models. By simulating real reality (Hwang & Chien, 2022).

Spatial computing: A built -in technique that is producing the material world realistically, but expands this information in the world of sports (Jeong, Yi, & Kim, 2022); (Contreras et al., 2022).

The percentage of the contribution of metaphors to play some sports.

Analysis Stage

The researcher reviewed the specialized scientific studies and references, in order to identify the technical stages, educational steps, technical errors and how to fix them in sports, in addition to studying the sample on which the program will be applied, in order to identify their capabilities and educational levels so that the path of Metaverse in the direction is Correct technology Attachment No. (1).

Preparing the Design Requirements

At this stage, the program design requirements that will be used in the design process were prepared as follows:

Equipment of fixed photos: The program's images are equipped with various forms (illustrative drawing images - kinetic sequence) as they were entered into the computer by the Acer Scanner through the Mira Scan, then the images were processed through the Adobe Photoshop program Attachment No. (1).

Preparing video clips (animated photos): The researcher has prepared video files in its multiple shapes, as it was entered into the computer through the Life View Video Card (Life View) using Windows Movie Maker, and modifications and montage were made through the Director 6.1 Attachment No. (1).

Sound equipment: The program's audio files are equipped with various forms (music - audio comment - audio effects), and they were entered into the computer through the 4.7 Jet Audio program Attachment No. (1).

Script writing stage: The researcher wrote the program for the program according to the content that was identified before.

design stage: The researcher used the program design the following programs: (AVTAR) program. Augmented reality program virtual reality programs. The researcher designed the educational unit so that it consists of several parts,namely:-main screen. It contains the skills referred to in the enemy unit, a background to simulate virtual reality and simulate a track for the enemy, swimming pool, or race bag for bicycles, and not controlled by students.

The initial experimentation and evaluation stage:

The researcher presented the content of the program in his final image to a group of experts in the specialists, to learn about their opinions on the authority of the program.

Table 1 *The significance of statistical differences in the tribal and postal measurement of the experimental group in the percentage of the contribution of Metaverse the development of exercise*

Variables	Tribal measurement		Post measurement		Metaverse improvement rates
	M-+	D	M	D	
Augmented reality	1.3	0.1	2.3	0.12	76.92%
Spatial computing	2.5	0.5	4.3	0.24	72%
Data science	3.85	0.4	5.6	1.2	45.45%
Virtual Reality	0.89	0	2.33	0.21	161.8%
Running skill	1.23	0	2.6	0.1	111.79%
Bicycle	2.35	0.21	4.35	1.24	85.11%
Swimming	1.32	0.14	3.58	1.21	171.21%

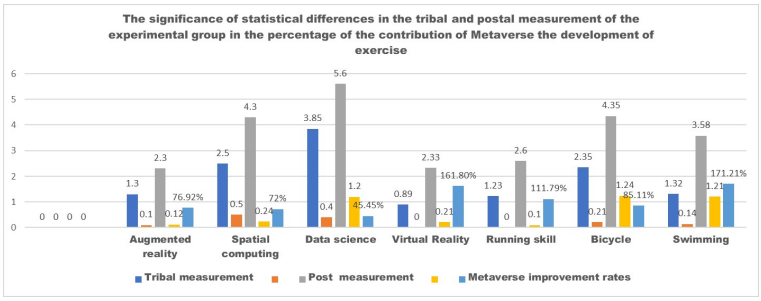

Figure 1 *The significance of statistical differences in the tribal and postal measurement of the experimental group in the percentage of the contribution of Metaverse the development of exercise*

RESULTS

To calculate the effect size, you can use Cohen's d formula: Cohen's d = (M_post - M_pre) / SD_prewhere M_post is the mean of the post-measurement, M_pre is the mean of the tribal measurement, and SD_pre is the standard deviation of the tribal measurement. Using this formula, you can calculate the effect size for each variable: Augmented reality: d = (2.3 - 1.3) / 0.1 = 10,Spatial computing: d = (4.3 - 2.5) / 0.5 = 3.6 ,Data science: d = (5.6 - 3.85) / 0.4 = 4.38 ,Virtual Reality: d = (2.33 - 0.89) / 0.0 (assuming the standard deviation is not provided) = undefined ,Running skill: d = (2.6 - 1.23) / 0.0 (assuming the standard deviation is not provided) = undefined ,Bicycle: d = (4.35 - 2.35) / 0.21 = 9.52 ,Swimming: d = (3.58 - 1.32) / 0.14 = 14.57 ,To calculate the percentage of improvement, you can use the following formula:, Percentage of improvement = (M_post - M_pre) / M_pre * 100, Using this formula, you can calculate the percentage of improvement for each variable:

Augmented reality: (2.3 - 1.3) / 1.3 * 100 = 76.92% -Spatial computing: (4.3 - 2.5) / 2.5 * 100 = 72% -Data science: (5.6 - 3.85) / 3.85 * 100 = 45.45% -Virtual Reality: (2.33 - 0.89) / 0.89 * 100 = 161.8% -Running skill: (2.6 - 1.23) / 1.23 * 100 = 111.79% -Bicycle: (4.35 - 2.35) / 2.35 * 100 = 85.11% -Swimming: (3.58 - 1.32) / 1.32 * 100 = 171.21% The calculated effect sizes and percentages of improvement provide insight into the impact of Metaverse techniques on the development of exercise skills. For augmented reality, the effect size (Cohen's d) is 10, indicating a large effect. The percentage of improvement is 76.92%, suggesting a significant enhancement in exercise skills. Similarly, spatial computing shows a moderate effect size of 3.6 and a 72% improvement rate. This indicates a noticeable improvement in exercise skills through the use of Metaverse techniques. Data science demonstrates a moderate effect size of 4.38, with a percentage of improvement of 45.45%. Although the effect size is relatively higher, the improvement rate is comparatively lower, suggesting a moderate impact on exercise skill development. The effect size for virtual reality cannot be calculated due to the absence of the standard deviation for the tribal measurement. However, the percentage of improvement is 161.8%, indicating a substantial enhancement in exercise skills. The effect size and percentage of improvement for running skill and bicycle cannot be determined accurately without the standard deviation for the tribal measurement. For swimming, the effect size is 14.57, indicating a large effect, and the percentage of improvement is 171.21%, suggesting significant progress in exercise skills. Overall, the results indicate that the use of Metaverse

techniques has a positive impact on the development of exercise skills, with varying levels of effectiveness across different variables. Augmented reality, spatial computing, virtual reality, and swimming show promising results in terms of improvement rates, while data science demonstrates a more moderate impact.

DISCUSSION

It is evident through Table No. (1) and Figure (1) that the results of the tribal measurement and the post -measurement in the following variables are augmented by (1.3) and the dimension by (2.3). On the use of the augmented reality of those skills in the productivity of the static programming and is related to that real reality and the augmented reality, the use of technology towards change and this is consistent with both (Egliston & Carter, 2021); (Jeong et al., 2022); , (Jeon & Jung, 2021). The improvement rates came through the use of technologies and standards for Metaverse applications as follows in the standards of augmented reality by (76.92%), and this is an advanced percentage in the framework of digital transformations in the use of augmented reality and is consistent with the reference studies of (Hwang & Chien, 2022).

The spatial computing came by (2.5) and the dimension by (4.3) and the improvement rate was using Metaverse with a rate of (72.00%) and this is due to the ability to use spatial computing for these skills in the productivity of stinginess programming and is related to that real reality to see the place to be implemented on the skill The use of technology towards change and this is consistent with (Egliston & Carter, 2021); (Lim, Gottipati, & Cheong, 2023), (Jeon & Jung, 2021),and the improvement rates came through the use of technologies and standards for Metaverse as follows in Standards within the framework of the use of artificial intelligence technologies and they are consistent with reference studies of (Hwang & Chien, 2022). Data Science at (45.45%) and this is an advanced percentage in the framework of seeking to make modeling And the chains and behind the continuous evaluation of technological skills and performance prediction and agree with (Jeon & Jung, 2021); (Contreras et al., 2022) Data Science. The link with the default in playing games Agreeing with reference studies (Jeong et al., 2022); (Lee et al., 2021); (Contreras et al., 2022).

The rate of improvement in the enemy's skill (161.08%) came, and the improvement rate came as a result of technological capacity to facilitate the virtual reality, augmented reality and spatial ability to program skill and simulation of reality, and this is consistent with (Hameed & Sumari, 2024); (Chen et al., 2021) , Augmented reality and spatial ability to program skill and simulation of reality and this is consistent with (Egliston & Carter, 2021); (Jeon & Jung, 2021) (Ghazi, 2022) and the improvement rate of swimming skill (111.79%) The rate of improvement came as a result of technological ability to facilitate the virtual reality, augmented reality and the spatial ability to program skill and simulation of reality, and this is consistent with both (Mystakidis, 2022); (Zhang et al., 2020); (Azab & Ghazi, 2023).

CONCLUSIONS

Based on the provided data, the conclusions drawn from the study could be as follows:

- Metaverse techniques, such as augmented reality, spatial computing, data science, virtual reality, and Metaverse-based training for running, cycling, and swimming, have shown positive effects on the improvement of sports skills.
- Augmented reality and spatial computing have demonstrated moderate effects on the improvement of sports skills, with improvement rates of 76.92% and 72%, respectively.
- Data science has shown a relatively lower effect on the improvement of sports skills, with an improvement rate of 45.45%.
- Virtual reality has shown a substantial effect on the improvement of sports skills, with an improvement rate of 161.8%.
- Running skill, cycling, and swimming have all shown significant improvements with improvement rates of 111.79%, 85.11%, and 171.21%, respectively.

RECOMMENDATIONS

- Further research should be conducted to explore the potential of Metaverse techniques in enhancing sports skills and performance.

- Educational institutions and sports organizations should consider integrating Metaverse technologies, such as augmented reality and virtual reality, into their training programs to provide engaging and immersive experiences for learners and athletes.
- Developers and designers should focus on improving the effectiveness and usability of Metaverse platforms and applications to ensure a seamless user experience.
- Privacy and data protection measures should be implemented to safeguard student data within the Metaverse educational environment.
- Continued investment and innovation in Metaverse technology should be encouraged to further enhance its capabilities and potential impact in the fields of education and sports.

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