

A STUDY TO EVALUATE THE ANTECEDENTS FOR ADOPTION OF METAVERSE IN THE EDTECH INDUSTRY

Dr. Aparna Jain

Associate Professor, Head of the Department of Business Studies, S K Somaiya College, Somaiya Vidyavihar University, Mumbai-400077, Email id: aparna.jain@somaiya.edu

Dr. Soniya Jhunjunwala

Assistant Professor, Department of Accountancy, SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben Jivanlal College of Commerce and Economics (Autonomous), Vile parle (W), Mumbai- 400 056, Email id: soniya.jhunjunwala@mithibai.ac.in

Dr Ram Kishen. Y

Professor, K.J. Somaiya Institute of Management, Somaiya Vidyavihar University, Mumbai-400077, Email id: ramki@somaiya.edu

Abstract-

With the introduction of new technology, education is being adopted, and interest in the metaverse is expanding. A 3D virtual world focused on learning and interacting through social connections is referred to as the "metaverse." The metaverse is an ideal model for education due to its rich multimedia streaming potential and immersive user experience with high-speed communication (Jagatheesaperumala, Ahmadb, 2022), making EdTech companies explore data-based teaching and AI based learning (Renz, Hilbig, 2020).

We provide a description of metaverse-based educational applications concentrating on education, training, and skill development, as well as an analysis of the technologies upon which they are built. This study intends to give content producers and marketers a methodology for evaluating the efficacy of metaverse in E-Learning environment. The fit of the model and the hypotheses with the metaverse presence, interoperability, ethical, economy, and seamlessness (PIEES) model are examined. This paper is a survey on education enabled through metaverse that explores customers purchase intentions on the use of a digital education platform in virtual & augmented reality. This paper will cover the scope of metaverse with respect to the E-Learning environment, and development of metaverse-based applications. The analysis done will make virtual learning platforms work smoothly on the metaverse, facilitating the ability to develop future metaverse based applications.

Keywords: *Education, Data-based teaching, Metaverse, Virtual reality, AI based learning*

1. Introduction

A significant change has occurred due to the widespread usage of the internet and the adoption of internet-based technology in our daily life. The volume, applications and kind of information have evolved. A number of new technologies were also brought about by the internet and related technologies. The Metaverse is one of these technologies. With the creation of the idea of the virtual world, this technology has permeated our lives.

The question of whether Integrating information and Communication Technology into the classroom will enhance students' learning is a trending topic in the world of education. There are many different points of view in this area. Some of these demonstrate how technology will not only have a negative impact on teaching practices but also be far from helpful.

In particular, the "metaverse" platform services bring together cutting-edge display device technology, superior lightweight graphics technology, and 5G network technology. The introduction of the metaverse platform, a new growth engine that links business and information, presents a new global market paradigm in the still-current COVID-19 recession. The metaverse offers a virtual experience with a high degree of immersion and connectedness, resulting in improved user value, and is unconstrained by time and place, which is favourable to a contactless era. The ability to access the metaverse from any location and at any time can be supported by PCs and mobile devices. Undoubtedly, smartphones rank among the most significant digital gadgets utilised to power the metaverse. Mobile phones can operate in the metaverse by connecting to all electronic equipment that can implement augmented reality (AR), virtual reality (VR), the Internet of Things, and self-driving mechanisms since they are outfitted with high-speed and hyper-connected qualities based on 5G technology.

PIEES Model:

The main feature that makes up the metaverse can be described using the presence, interoperability, ethical, economy and seamlessness (PIEES) model.

Presence: A circumstance where the user spatially or temporally feels they are on the platform even while physical touch is not feasible is referred to as a sense of presence. In other words, the perception of realism becomes crucial because the metaverse is a virtual environment where users cannot truly interact physically.

Interoperability: Data and information from the metaverse are connected in the physical world through interoperability. Simply said, this indicates that a user's experience and the information that must be gathered on a platform are not only applied to the virtual world but also work in harmony with one another through connecting to the real world.

Ethical: Data copyright and security is of utmost importance to strengthen the roots of metaverse in Edtech industry.

Economy: Economic flows in the metaverse are typically distinguished by interactions between sellers and buyers that go beyond the norms of a standard market. Users can freely exchange goods and services with one another using the platform's money, creating an economic flow.

Seamlessness: When several experiences on a single platform are connected seamlessly, even when a particular character is connected to a previous circumstance, the experience can still be without interruption by keeping any previous acts or experiences on the platform.

2. Literature Review

The research emphasises the benefits of using metaverse in educational settings. Metaverse, a more advanced term than VR, is a compound word made up of the words "meta" and "universe," which stand for "virtuality" and "transcendence." A different definition of the metaverse is as an independent service offered for diverse social phenomena that emerge in the marketplace as technology advances (Cammack, 2010). According to empirical studies, using AR can improve learning and learning outcomes. More specifically, most of the studies reported that the use of AR can promote enhanced learning performance (Chang, Hou, Pan, Sung, & Chang, 2015), positive attitudes on learning (Lu & Liu, 2015), and learning motivation, and can “help students to understand” and “enhance satisfaction” (Akçayır & Akçayır, 2017). Additionally, some researchers have supported that students consider AR technology both easy to use and enjoyable (di Serio, Ibáñez, & Kloos, 2013).

The benefit of producing a sense of reality through a high level of immersion in a virtual area with mixed settings is a feature of both virtual reality and augmented reality. By 2030, the VR/AR market is expected to have increased by up to 40 times from its size in 2021 (AR and VR Market Research Report: By Type (AR, VR), Offering (Hardware, Software), Device Type (AR Devices, VR Devices), Application (Consumer, Commercial, Enterprise) - Global Industry Analysis and Growth Forecast to 2030, 2022). VR and augmented reality have many uses and great potential for education. Because students can safely and regularly practise complicated and challenging activities in virtual settings, VR education is now used in some disciplines that require hands-on experience (Hamilton, McKechnie, Edgerton, & Wilson, 2021)

Due to the communication challenges associated with COVID-19, immersive technology, such as virtual reality, is needed for teaching and training. Its benefits include flexible training schedules and locations (Pears, Yiasemidou, Ismail, Veneziano, & Biyani, 2020). Students are encouraged to take initiative in VR education since they learn via experience (Philippe, et al., 2020). Although VR is effective in that it enables teachers to place students in learning situations that are challenging to replicate in reality, its adoption in the field of education has been constrained by the high cost of equipment and the difficulty of its deployment (Richard, Tijou, Richard, & Ferrier, 2006). E-Learning (we use the term e-learning to denote the educational and learning application types, i.e., E-Learning, M-Learning, Blended Learning, Virtual Learning, Distance Learning, and Online Learning) can successfully use the metaverse as a solution for the subjects that completely depend on convergence and cannot be taught online or through distance learning, like medical and engineering courses. Although there are many various types of e-learning environments (Jacobs, 2022), metaverse-based systems can also be utilised to deliver secure and effective learning and working environments by implementing virtual reality technology and continuously researching and trying to broaden learning experiences.

Businesses that supply goods and services for the metaverse have been developed by corporations, institutions of higher learning, governmental agencies, the fashion industry, and popular culture, with significant societal repercussions. The metaverse is evolving into a way of online social life for Generation MZ, which encompasses millennials (those born between the early 1980s and the

early 2000s) and Generation Z (those born between the mid-1990s and the early 2000s), who are accustomed to the Internet and digital gadgets. Users can experience daily life in a virtual environment where the line between reality and virtuality has been blurred thanks to the metaverse, which enables users to immerse themselves in a space where the digital and physical worlds collide (Kim, 2021).

3. Research Method

The research consisted of having the following parameters, for which the respondents were asked to give their opinions based on a Likert scale. Seamlessness, Presence, Interoperability Ethics, Economy

All of the above factors were to understand the different perspectives pertaining to introduction of metaverse in the educational sector. Essentially, these are the factors that can have maximum impact on the purchase intention of the students with respect to the metaverse concept within educational methods. Therefore, we can consider Purchase Intention to be the dependent variable for our study.

The research was conducted on 200 respondents of all genders. The level of education varies from SSC to PhD, including 5 different fields of study, namely, business management, medical sciences, engineering, commerce and arts. The questionnaire was aimed at understanding their opinion about the introduction of metaverse in education.

To determine the reliability of the research data, we have used Cronbach's alpha. The values of the test presented in the results section demonstrate that all the chosen factors are reliable data and thus can be used for further analysis. Further, to check the validity of each factor, we have used the KMO and Bartlett's Test, which produce a certain value of significance for each factor. Regression Analysis is then performed to shortlist the factors which define the dependent variable (purchase intention), i.e., they have the most significance for the purchase intention. Based on all of these factors, Regression is performed to draw out a final equation for the dependent variable.

4. Results and Implications

4.1 Review of the Reliability and Validity of the Measurement Concept

To assess the internal consistency of the measurement tool, the validity and reliability of the measurement concept were reviewed. According to (Onwuegbuzie and Daniel, 2000), the degree of homogeneity or consistency of the items' contents was measured through the correlations between the items to measure reliability using multiple items. (Muchinsky, 1996) contended that reliability could also refer to stability, internal consistency, accuracy, and predictability, and that the value to be measured should be evaluated using Cronbach's alpha. Cronbach's alpha ranged from 0 to 1. The higher the value, the more consistent the items' internal consistency. According to (Hair et al., 1995) the applied value of Cronbach's alpha is considered to have high reliability between 0.8 and 0.9; however, the reliability measurement coefficient is not fixed, and no standard value exists. Furthermore, a Cronbach's alpha coefficient of 0.7 can be used to determine whether reliability is generally secure. The Deleted Cronbach's alpha coefficients of the metaverse

proposed model variables in this study show that deleting any of the parameters of seamlessness, sense of presence, interoperability, and economic flow reduces the value of Cronbach alpha below the set value of 0.878, indicating that all variables should be included in the analysis. And thus, it suggest that there is no reliability problems. The results are summarized in Table 4.1.1 and Table 4.1.2

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.875	.878	20

Table 4.1.1. Reliability verification results.

		Cronbach's Alpha if Item Deleted
Seamlessness	[Learning experience becomes flexible with Metaverse]	.869
	[Virtual/digital tools (Google Classroom, Kahoot etc.) available today for educational purposes are comfortable to use]	.873
	[You can pause/resume studies from anywhere]	.868
Presence	[Metaverse assists students in active participation]	.868
	[Level of concentration increases in metaverse]	.868
	[You feel present in the lesson, disconnected from the physical world]	.865
Interoperability	[Metaverse in education will save student's time and effort]	.863
	[Metaverse in education will overpower the quality of education]	.862
	[All the subjects can be taught in the metaverse]	.863
	[Learning in metaverse is more convenient]	.867
Ethical	[Confidential/personal data is prone to breaches]	.877
	[Metaverse can be used for malicious purposes]	.874
	[Users will act and communicate responsibly in the metaverse]	.870
	[Educational content is prone to infringement of copyrights]	.871
Economy	[Traditional mode of education is cheaper]	.877
	[Education through metaverse is costly]	.875
	[Gadgets required with metaverse are worth the cost]	.868
	[Experience is worth the cost]	.862
	[Are you willing to invest in metaverse for your education]	.865

Purchase Intentions	[Education through metaverse will become cheap in the future]	.870
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Table 4.1.2. Reliability verification results.

Analysing the measurement variables for validity.

On the valid sample, an exploratory factor analysis was performed to better understand the validity review for each factor. The results of the exploratory factor analysis, as shown in Table 4.1.3, revealed that the Kaiser-Meyer-Olkin (KMO) value of the metaverse SPIE model independent variables was 0.723, the Bartlett sphericity test result was 1934.846, and the significance probability was 0.000, indicating that the variables chosen for the factor analysis were appropriate.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.723
Bartlett's Test of Sphericity	Approx. Chi-Square	1934.846
	df	153
	Sig.	.000

Table 4.1.3. Results of the exploratory factor analysis of independent variables.

4.2 Regression analysis

The main goal of this analysis is to determine how much each independent variable influences purchase intent and what actions should be taken based on the results obtained with SPSS. Following table 4.2.1 show the regression model.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	.352	.156		2.259	.025	.045	.660
Economy [Experience is worth the cost]	.565	.065	.462	8.688	.000	.437	.693
Interoperability [Metaverse in education will	.275	.055	.266	4.956	.000	.166	.384

save student's time and effort]								
Economy [Traditional mode of education is cheaper]	-.269	.040	-.295	-6.704	.000	-.348	-.190	
Presence [Level of concentration increases in metaverse]	.171	.045	.179	3.760	.000	.081	.260	
Ethical [Educational content is prone to infringement of copyrights]	.149	.044	.160	3.417	.001	.063	.235	
a. Dependent Variable: Purchase Intentions [Are you willing to invest in metaverse for your education]								

Table 4.2.1. Regression coefficients

Based on the nonstandard coefficients we get the regression equation as:

$$y = 0.352 + 0.565 x_1 + 0.275 x_2 - 0.269 x_3 + 0.171 x_4 + 0.149x_5$$

where x_1 = Economy [Experience is worth the cost], x_2 = Interoperability [Metaverse in education will save student's time and effort], x_3 = Economy [Traditional mode of education is cheaper], x_4 = Presence [Level of concentration increases in metaverse] x_5 = Ethical [Educational content is prone to infringement of copyrights].

In our coefficients table, the "Sig." column contains the (2-tailed) p-value for each b-coefficient. As a rule, a b-coefficient is statistically significant if it has a value of "Sig." or p 0.05. As a result, only a subset of the b-coefficients in our table are statistically significant. And the included variables are Economy [Experience is worth the cost], Interoperability [Metaverse in education will save student's time and effort], Economy [Traditional mode of education is cheaper], Presence [Level of concentration increases in metaverse], Ethical [Educational content is prone to infringement of copyrights].

Standardize b-coefficients can be used to compare the relative strengths of our predictors. As a result, the five most powerful predictors in our coefficients table are:

- a) Economy [Experience is worth the cost] (0.462)
- b) Interoperability [Metaverse in education will save student's time and effort] (0.266)
- c) Economy [Traditional mode of education is cheaper] (-0.295)

- d) Presence [Level of concentration increases in metaverse] (0.179)
- e) Ethical [Educational content is prone to infringement of copyrights] (0.160).

Stating that the above factors contribute relatively higher in driving the purchase intention of the customer as compared to any other factor.

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	117.515	5	23.503	82.355	.000
	Residual	55.365	194	.285		
	Total	172.880	199			

Table 4.2.2. Analysis of variance - ANOVA

Table 4.2.2 shows that the calculated F value for the variance generated by the regression is 82.355. The critical value of F with 5 degrees of freedom and a significance level of 0.00. When we compare the values of F, we can see that accepting the alternative hypothesis is required. This means that the multiple regression model has a significant influence on the dependent variables.

5. Discussion and Direction for Future Research

According to the findings of the study, students had not previously used the Metaverse. As a result, it is possible to conclude that the students lack experience with the Metaverse application and are unfamiliar with it. The primary reason could be that Metaverse is still not widely used, and there is insufficient research on its effectiveness in the learning and teaching processes. However, with the announcement of Metaverse as the future of the Internet by social media giants such as Facebook and large technology companies, it can be stated that it has begun to attract the attention of a wider audience and has become quite widespread in many fields in recent years.

However, according to our findings, the majority of students wanted to use the Metaverse environment in the classroom. The interviews with the students reveal the reason for this. Students expressed positive attitudes toward Metaverse and thus desired to use the Metaverse environment because they believe that Metaverse provides permanent and meaningful learning, makes the classroom fun, activates students, and ensures their participation in the classroom. Based on our findings, it is recommended that students be allowed to use Metaverse, and that Metaverse-related applications be brought into the classroom to educate students about new technologies.

6. Conclusion

As per the results, we can conclude that the adoption of metaverse as a concept in education and there purchase intentions is based on these parameters: experience being worth the cost, saving the

time and effort of students, increased level of concentration in metaverse and the ethical aspects related to the data.

Since this is a fairly new concept and there haven't been many developments especially in the education sector, it is difficult to derive concrete results. However, with the growing popularity of AR and its widening horizon, it wouldn't be a surprise to see education transforming with this technology too and would change the consumer behaviour specifically focusing on factors which are driving their purchase intentions. Also Including this experience will certainly increase the motivation in students to learn more. It will have a positive impact on concept-building and constructing knowledge.

Thus, it should be noted that we should design, develop, test, and validate a tool for using the metaverse to develop learning for students, making it a useful tool for collecting students' affinity for AR and the formation of logical ability.

References

- Akçayır, M., & Akçayır, G. (2017). Advantages and Challenges Associated with Augmented Reality for Education: A Systematic Review of the Literature. *Educ. Res. Rev.*, 1–11.
- AR and VR Market Research Report: By Type (AR, VR), Offering (Hardware, Software), Device Type (AR Devices, VR Devices), Application (Consumer, Commercial, Enterprise) - Global Industry Analysis and Growth Forecast to 2030. (2022, January 29). Retrieved from PS Market Research.: <https://www.psmarketresearch.com/market-analysis/augmented-reality-and-virtual-reality-market>
- Cammack, R. (2010). Location-based service use: A metaverse investigation. *J. Locat. Based Serv.*, 53–65. Retrieved from <https://www.tandfonline.com/doi/abs/10.1080/17489721003742827?cookieSet=1>
- Chang, Y., Hou, H., Pan, C., Sung, Y., & Chang, K. (2015). Apply an Augmented Reality in a Mobile Guidance to Increase Sense of Place for Heritage Places. *J. Educ. Technol. Soc.*, 166–178.
- di Serio, A., Ibáñez, M., & Kloos, C. (2013). Impact of an Augmented Reality System on Students' Motivation for a Visual Art Course. *Comput. Educ.*, 586–596.
- Hair, J. J., Anderson, R., Tatham, R., & William, C. (1995). *Multivariate Data Analysis with Readings*. Prentice Hall: Hoboken, NJ, USA.
- C., Bhuvaneshwari, L., Sathyakala, S., Dhinakaran, D. P., Arun, R., & Lakshmi, M. R. (2023). The Effect of Fintech on Customer Satisfaction Level. *Journal of Survey in Fisheries Sciences*, 10(3S),6628-6634. L
- R. Arun, M. Umamaheswari, A. Monica, K. Sivaperumal, Sundarapandiyan Natarajan and R. Mythily, "Effectiveness Performance of Bank Credit on the Event Management Firms in Tamilnadu State", In: Satyasai Jagannath Nanda and Rajendra Prasad Yadav (eds), *Data Science and Intelligent Computing Techniques, SCRS, India, 2023*, pp. 463-470. <https://doi.org/10.56155/978-81-955020-2-8-42>
- Singh, B., Dhinakaran, D. P., Vijai, C., Shajahan, U. S., Arun, R., & Lakshmi, M. R. (2023). Artificial Intelligence in Agriculture. *Journal of Survey in Fisheries Sciences*, 10(3S), 6601-6611.

- Mythili, Udhayakumar, Umamaheswari, Arun (2023) Factors Determining Mutual Fund Investments in Coimbatore City, *European Chemical Bulletin*, 12(special issue 6), 4719– 4727.
- Arun, R. "A Study on the Performance of Major Spices in India." *Recent Trends in Arts, Science, Engineering and Technology* (2018): 149.
- Arun, Umamaheswari,(2016), Service quality dimensions and its effect on customer satisfaction on service provided By star hotels of Nilgiri District, *Asia Pacific Journal of Research*, Vol:I. Issue XL, 243-246, <https://in.docs.wps.com/l/sIMmSgZfUAayf56MG?v=v2>
- K. Rani, Dr. J.Udhayakumar, Dr. M.Umaheswari, Dr.R.Arun,(2023) “Factors Determining The Purchases of Clothing Products Through Social Media Advertisements in Coimbatore City”, *European Chemical Bulletin*,12(special issue 6), 4728– 4737.
- Anitha, Jagadhambal, Arun (2023), Factors Determining the Leadership Qualities of Female Leaders in Higher Education Institutions, *European Chemical Bulletin*,12(Special Issue 6), 1416-1424.
- Edson Nirmal Christopher, Sivakumar, Arun ,Umamaheswari (2023) Iimmunoinformatic Study for a Peptide Based Vaccine Against Rabies Lyssavirus Rabv Strain Pv, *European Chemical Bulletin*, 12(special issue 9), 631– 640.
- Arun (2019), "Sustainable Green Hotels -Awareness for Travelers", *International Journal of Emerging Technologies and Innovative Research* ISSN:2349-5162, Vol.6, Issue 4, page no. pp343-347,<http://doi.one/10.1729/Journal.20408>
- Bhuvaneshwari, Arun (2018) Food safety awareness to consumers, *RESEARCH REVIEW International Journal of Multidisciplinary*, Vol.03, Issue 12, 1006-1008, <https://old.rrjournals.com/past-issue/food-safety-awareness-to-consumers/>
- Anitha, Karpagambigai, Arun (2023), Factors Influencing the Organization to Practice Green Hrm: A Study Concerning Coimbatore District, *European Chemical Bulletin*,12(Special Issue 6), 1406-1415
- Umamaheswari, Kanchana, Arun, Anita Dalal, Priya (2023), Factors Determining the Social Media Usage Among College Students in Chennai, *Journal of Harbin Engineering University*, Volume no. 44, Issue 7, Pp 505-511.
- Sivaperumal, Appasaba, Sivakumar, Arun, Surekha Adiki (2023), Portfolio Management Strategies Among Nse Listed Mutual Fund Companies, *Journal of Harbin Engineering University*, Volume no .44. Issue 7, Pp 497-504
- Prakash, Praveena, Arun, Sundarapandiyam, Sivaperumal (2023), Supply Chain Mapping and Backward and Forward Linkages of Pomegranate Supply Chain in India, *European Chemical Bulletin*,12(Special Issue 6), 2289-2297
- Arun R, and Bhuvaneshwari R (2019). Buying behavior of meet’s consumption relates to food safety from north and south part of the Coimbatore City. *International Journal of Recent Technology and Engineering*, 7, 429-433. <https://www.ijrte.org/wp-content/uploads/papers/v7i5s/ES2177017519.pdf>

- Prakash Priya, Vanithamani, Arun, Vaisshnave, Thyagarajan (2023), Profitability Influencers of Indian Steel Companies: An Analytical Study, *Journal of Namibian Studies*, Vol. 35, Issue: 1, Pp. 38-48
- Sivakumar, Poornima, Arun (2023), A Study on Software Innovation and Computer Networking Knowledge in Entrepreneurship, *European Chemical Bulletin (ISSN 2063-5346)*, Vol. 12, Issue 8, Pp.8959-8969
- Hamilton, D., McKechnie, J., Edgerton, E., & Wilson, C. (2021). Immersive virtual reality as a pedagogical tool in education: a systematic literature review of quantitative learning outcomes and experimental design. *Journal of Computers in Education*, 32.
- Jacobs, N. (2022, January 29). Are Online Learning, Virtual Learning, E-Learning, Distance Learning, and Blended Learning the Same? Retrieved from conexed: <https://conexed.com/2019/11/11/are-online-learning-virtual-learning-e-learning-distance-learning-and-blended-learning-the-same/>
- Jagatheesaperumal, S. K., Ahmad, K., & Qadir, J. (2022). Advancing Education Through Extended Reality and Internet of Everything Enabled Metaverses: Applications, Challenges, and Open Issues. <https://doi.org/10.48550/arXiv.2207.01512>
- Renz, A., & Hilbig, R. (2020). Prerequisites for artificial intelligence in further education: identification of drivers, barriers, and business models of educational technology companies. *International Journal of Educational Technology in Higher Education*, 17(1). <https://doi.org/10.1186/s41239-020-00193-3>
- Kim, G. (2021). Evolution of the real and virtual worlds through metaverse examples. *Broadcast Media Mag.*, 10-19.
- Lu, S., & Liu, Y. (2015). Integrating Augmented Reality Technology to Enhance Children's Learning in Marine Education. *Environ. Educ. Res.*, 525–541.
- Muchinsky, P. (1996). The correction for attenuation. *Educ. Psychol. Meas*, 56,63-75.
- Nunnally, J. (1978). *Psychometric Theory*. New York, NY, USA,: 2nd ed. McGraw-Hill.
- Onwuegbuzie, A., & Daniel, L. (17–19 November 2000). Reliability generalization: The importance of considering sample specificity, confident intervals,. KY, USA: Mid-South Educational Research Association.
- Pears, M., Yiasemidou, M., Ismail, M., Veneziano, D., & Biyani, C. (2020). Role of immersive technologies in healthcare education during the COVID-19 epidemic. *Scottish Medical Journal*, 65.
- Philippe, S., Souchet, A., Lamas, P., Petridis, P., Caporal, J., Coldeboeuf, G., & Duzan, H. (2020). Multimodal teaching, learning and training in virtual. *Virtual Real. Intell. Hardw.*, 421–442.
- Richard, E., Tijou, A., Richard, P., & Ferrier, J. (2006). Multi-modal virtual environments for education with haptic and olfactory feedback. *Virtual Real.*, 207-225.