مجلة البحوث المالية والتجارية
المجلد (25) – العدد الثالث – يوليو2024

Understanding Parent's Acceptance to use Virtual Reality Glasses in Egyptian Primary School using the Protection Motivation Theory

Dr/ Lamiaa mostafa mohamed
Associate professor -Business information systems - Arab Academy for Science and Technology

Lamiaa.mostafa31@aast.edu

Lamiaa.mostafa31@gmail.com

تاريخ الإرسال	7 –1 -2024
تاريخ القبول	11 –3 -2024
رابط المجلة:	https://jsst.journals.ekb.eg/

Abstract:

This study aims to develop an understanding of the perspective of Egyptian parents on children using Virtual Reality (VR) glasses in primary education stages. Many factors affect users 'decisions to use new technology including the threat severity, threat vulnerability, response efficacy, self-efficacy, fear, and trust school. This study is a quantitative research examines the acceptance of using Virtual Reality glass in primary Education using Structured Equation Modeling (SEM).An online survey was designed to collect the desired data where the sample size is 875 participants. The proposed research model was developed based on the conducted analysis. Theproposed model would help educational institutions understand the factors that affect using virtual reality techniques in the education process. The study's results show that there is a significant impact to threat severity, response efficacy, fear, trust school. However, self-efficacy and threat vulnerability are not significant.

Keywords: Primary Education, Virtual Reality, glass; PMT; primary education; acceptance to use; Structured Equation Modeling; Egypt.

1. Introduction:

Education is commonly described as the process of instigating lasting behavioral changes in individuals through their personal experiences (Mostafa, 2020). Learning, on the other hand, is a cognitive undertaking that necessitates active engagement from the individual (Fer, 2011).Concerning education and instruction, the aim is to alter individuals' behaviors, knowledge, and approaches. Technological advancements introduce numerous implementations aligned with this definition, offering efficient and enduring learning opportunities.

The evolution of Augmented reality and Virtual Reality (VR) applications are tailored for different fields like manufacturing, health commerce and educational purposes. These VR implementations have been the subject of discussion for several years and are among the technologies developed for diverse objectives (Scorgie et al., 2023;Lainem et al., 2023;Ma, 2021).

One could assert that Virtual Reality (VR) implementations, as extensively noted in literature, offer numerous favorable aspects. Furthermore, VR application exist across various domains including human resources(Chen et al., 2021), health and science (Johnson-Glenberg, 2018 ; Bailenson et al., 2008). In education, the utilization of VR has surged in tandem with the advancement of computer-aided education (Mystakidis, 2020;Lainem et al., 2023).

Moreover, VR-based teaching materials are anticipated to ease the learning process, offering diverse learning outcomes such as visualizing abstract concepts, observing atomic or astronomic events, interactive learning experiences, virtual excursions, and simulating unsafe environments in a secure manner (Scorgie et al., 2023). Considering these positive attributes of VR applications, it is posited that this technology could effectively enhance education process (Scorgie et al., 2023;Mostafa, 2020; Mostafa, 2022).

The paper examines the acceptance to use virtual reality glasses in the education process in primary schools. Factors are extracted from previous researchers examined using structured equation modeling. A research model is created based on the variables selected from previous research; such model aims to help educational institutions

adapt VR in the educational process and manage the acceptance level of the primary education students and their parents.

This paper contains five major sections. Section one provides an introduction about the research. Section two briefly describes the literature review that includes education, new technologies and factors affecting the acceptance to using virtual reality glasses. In section three, a description of the proposed research model and research hypotheses are discussed. In addition, section three presents the research methodology, data collection, sample size and survey. Section four provides the statistical analysis, consisting of descriptive analysis, reliability test, exploratory factor analysis and confirmatory factor analysis. Section five offers a discussion of the results. Finally, implications of this research, limitations and future work a represented in section six.

2. Literature Review:

The Protection Motivation Theory (PMT) stands as a widely embraced health theory, initially formulated by Rogers in 1975 (Rogers, 1975). It underwent subsequent revisions and enhancements aimed at evaluating threats and coping mechanisms in a comprehensive (Seow et al., 2021). This reasoning for this was to elucidate cognitive processes governing behavioral responses to threats. The theory encompasses three fundamental factors: the seriousness of a situation, the probability of that situation occurring without an adaptive response, and the effectiveness of a coping mechanism in preventing the detrimental situation (Halan, 2021). PMT is considered significant since it focuses on the cognitive processes involved in behavioral change and its advancement in understanding behavioral alterations (Kwasnicka, et al., 2016).

PMT operates on two interrelated paths: Threat Appraisal, which assesses maladaptive behaviors, and Coping Appraisal, which evaluates the ability to manage and prevent potential risks arising from Threat Appraisal (Prathap, 2020). The model assumes that addressing threats is contingent upon an individual's personal motivation for self-protection (Prathap, 2020). In PMT, the first path involves threat appraisal, constructing beliefs concerning severity

(the adverse consequences of a threat referred to as perceived severity) and perceived vulnerability (expectations of being affected by potential negative consequences) (Seow et al., 2021). Consequently, if an individual perceives high severity and vulnerability, they are inclined to engage in health-promoting behaviors (Huo, et al., 2018). Coping appraisal, the second path in PMT, involves evaluating the effectiveness of protective behavior against threats (response efficacy), belief in one's ability to execute protective behavior (self-efficacy), and assessment of the costs associated with performing protective behaviors, such as money, time, energy, and effort (perceived response cost). Threat assessment and coping mechanisms combine to form protection motivation (Singh, et al., 2021), reliably forecasting whether an individual will engage in protective behaviors or not (Seow et al., 2021).

PMT's influence on business and technology-related concerns, such as the adoption of new technologies and value co-creation, has been explored in various studies (Crossler et al., 2014). These studies examined PMT factors to determine students' intentions and employees' compliance with bringing their own devices. Results indicated that intentions were influenced by threat severity and motivated by self-efficacy and response efficacy (Crossler et al., 2014). Evaluating IT threat avoidance behavior among business students (Liang and Xue, 2010), the findings highlighted that self-efficacy, perception of threat, effectiveness of safety measures, and costs could predict avoidance behavior (Liang and Xue, 2010, Moody and Polak, 2015). Another study (Liang and Xue, 2010) tested the PMT model by manipulating fear appeals in different contexts to understand students' intentions and motivations to engage in more secure behaviors by backing up data. Results showed that strong fear appeals correlated with strong intentions to perform backups and actual backup behavior, with perceived costs being the most critical predictor of backup intentions (Moody and Polak, 2015).

In line with previous research, this study focuses on four critical PMT variables: threat vulnerability, threat severity, response efficacy, and self-efficacy (Seow et al., 2021, Wong,et al., 2016).

Threat vulnerability and threat severity constitute the framework for threat appraisal in this study. Threat vulnerability, in this context, refers to the tendency of feeling anxious and fearful when faced with the prospect of using money. Threat severity measures the likelihood and seriousness of these worries arising when it comes to using money. Self-efficacy and response efficacy contribute to the coping appraisal. Self-efficacy involves assessing the ease, convenience, and knowledge ability in using mobile payment methods. On the other hand, response efficacy pertains to how the use of mobile payments is perceived concerning environmental and safety considerations.

Virtual Reality (VR) traces its roots back to the 19th century when the concept took shape with the development of the stereoscope. The advent of modern VR technology emerged in the 1960s through the Sensorama device, incorporating multiple sensory vision, hearing, olfaction which provided users with an immersive encounter through five short films (Rendevski et al., 2022). VR proved its potency and found application across diverse industries (LaValle, 2023).

VR configurations can broadly be categorized into immersive and non-immersive setups (Buttussi &Chittaro, 2021; Paes et al., 2021). Both configurations represent computer-generated simulations, where immersive VR, employing visual display devices, offers heightened realism akin to real-life experiences, while non-immersive VR typically relies on standard computers (Scorgie et al., 2023).

Prominent among immersive VR devices are VR headsets, such as head-mounted displays (HMDs) and projection-based systems. HMDs, prevalent visual display devices, deliver the 3i features, offering users stereoscopic 3D visuals and head-tracking capabilities for interaction within the virtual environment. These headsets, like the growing market of VR headsets, are lightweight and designed for comfortable, extended use (Chen et al., 2021;).

The concept of agency, particularly significant in education, refers to controlling one's actions and thereby influencing external

events. VR potentially extends this sense of agency by allowing individuals to manipulate their environment through their movements (Mostafa, 2023). This aspect could potentially enhance attention and engagement, thereby affecting learning outcomes positively. This research aims to ascertain whether embodied learning itself enhances learning outcomes or if VR, by capturing learners' attention, further contributes to this enhancement. This aligns with the crucial integration of technology in education across all levels (Mostafa, 2023).

However, it's vital that technological innovation for VR in education doesn't solely prioritize engagement and entertainment at the expense of learning efficacy (Mostafa,2022). The VR setup used in this research is intentionally straightforward and accessible as the researcher seeks to understand VR's role as a learning tool rather than an entertainment medium in Danish primary schools. Future research might explore game-based learning, which shows promise, particularly in improving learning attendance, motivation, and engagement, crucial for reading skill development (Mostafa and Beshir,2022); Mostafa and Elbarawy, 2018). Investigating gamification's role in reading interventions presents exciting prospects (Jamshidifarsani et al., 2019).

While traditional classroom learning enables direct teacher-student interaction, it lacks diverse teaching methods and practical experiences (Deslauriers et al., 2019). VR presents a unique opportunity to combine the strengths of traditional teaching with immersive and captivating learning experiences (Bailenson et al., 2008).

Lee and Hwang(2022) focused on categorizing students' work with tablets in a special elementary school in the Czech Republic. The research comprised two phases. Firstly, a four-year structured observation of pupils at the aforementioned school led to the proposal of the categorization system. Secondly, this categorization was validated through research involving 361 special needs students across the Czech Republic.

Gybas (2019) focused on using tablets extensively in special education due to its capability to cater to the needs of individuals with special educational requirements, particularly through the Assisted Access Function.

Furthermore, VR is believed to enhance students' cognitive abilities, such as knowledge retention and academic performance, by merging actual environments with simulated virtual settings. Multiple studies have demonstrated that the impact of VR technology in classrooms improves both short- and long-term knowledge retention (Lainem et al., 2023).

Despite this, a recent systematic review (Lainem et al., 2023) noted a significant decline in the utilization of I-VR in inquiry-based learning approaches. While 27 out of 157 publications (17%) highlighted the use of VR in primary school settings, most of the educational VR interventions reviewed were conducted in a non-immersive nature. Hence, this research's objective was to assess how immersive I-VR impacted the experiences of primary school students in an educational setting. Given that this technology was relatively new to them, there was much more emphasis on understanding their overall learning experiences rather than merely the learning outcomes in specific subjects. Researchers aimed to explore the potential applications of this I-VR system, how young children perceived its usage, and the emotional impact it had on them when used within a school environment.

In a study conducted by Pande (2021), students instructed through VR interventions exhibited an average increase of 30% in test scores. On the other hand, those taught using traditional methods (video) showed minimal effects on test performance. Additionally, the long-term retention of acquired knowledge was notably positive, with a mean score of 81.2 _ 23.7%. This suggests that virtual learning leads to improved knowledge acquisition and learning outcomes, particularly in test scores. Furthermore, research by Freitas et al. (2020) suggested that VR-based immersive technologies offer students better possibilities for retaining content over longer periods compared to other methods.

Rho et al. (2020) explored the use of VR in manual language learning and discovered increased levels of engagement, confidence, and memory retention. VR acted as a medium for self-directed language acquisition, indicating its potential to enhance learning processes and memory retention more effectively.

The use of VR in classroom settings also enhances academic performance and achievement. For instance, Gloy et al. (2021) and Barrie et al., (2019) conducted experiments in medical teaching, specifically anatomy, using VR technology. Their study found that groups utilizing immersive anatomy atlas environments for studying human anatomy performed better on anatomical tests than their counterparts. Similarly, Ma (2021) examined the impact of VR-based contexts on college students' English learning ability, revealing improved academic performance among students learning in immersive virtual environments. Additionally, another study noted a 37% improvement in overall test results for teaching complex subjects like astro dynamics through VR implementation (Berthoud,and Walsh, 2020).

Apart from cognitive advantages, studies have highlighted socio-emotional benefits resulting from integrating VR components into instructional contexts. Peixoto et al. (2021) observed that immersive VR settings not only increased learners' motivation and satisfaction but also offered substantial pedagogical benefits for second and foreign language education compared to conventional practices. Huang et al. (2021) suggested that VR tools can boost language learning by providing immersive experiences, enhancing motivation, and reducing language learning anxiety. The sense of presence and social perception were identified as factors influencing learning satisfaction among students. Overall, existing literature strongly supports that VR-based education can benefit students by improving academic performance, knowledge retention, motivation, and satisfaction through interactive experiences with virtual objects in a 3D environment.

Mystakidis (2020) introduced a metaverse course aimed at sustaining interest and engagement in distance learning for higher education. Postgraduate participants showed high engagement levels in the metaverse platform, indicating that gamified elements

stimulated their interest, motivation for learning, and academic autonomy. While real-time interactions hold significant pedagogical value difficult to replicate online, the metaverse offers an alternative where a strong sense of telepresence can be felt, meeting with other avatars in the same 3D virtual area.

Education within a metaverse facilitates multimodal learning opportunities grounded in real human interaction. Kress's multimodal learning theory emphasizes engaging multiple human senses in learning processes, aiding better understanding and memory retention. Embracing multimodality is crucial in education to comprehend various communication modes and create diverse learning styles by combining visual, aural, linguistic, gestural, and spatial elements (Mostafa, 2023).

The COVID-19 pandemic has limited certain modes of communication in education, particularly in terms of gestural and spatial designs, creating disruptions. Digital textbooks, with or without VR content, face challenges in remote execution. Hence, adopting a metaverse-based design for learning materials in digital textbooks emerges as a feasible alternative. In a metaverse, avatars embody experiences, positively influencing learning through human gestural behaviors and paralinguistic language use. Avatars enable nuanced interactions in high-fidelity 3D worlds, offering various immersive experiences. Education in a metaverse not only transitions visual, aural, and linguistic modes from a 2D monitor to 3D immersion but also enhances learning engagement through gestural modes via avatar movements and enriches learning experiences in 3D spatial design and visualization. (Lee, et al., 2022)

3. Research Methodology:

Research Framework and Hypothesis

The following subsections define each variable and the suggested hypothesis based on the previous work.

The paper aims to understand the parents' acceptance when it comes to using VR headsets in schools. The researcher used perceived threat severity, threat vulnerability, response efficacy, self-efficacy, fear, school trust selected from the literature. Each variable is described on the following subsections:

-Threat Severity:

Rogers (1975)defines severity as the extent of harm affecting individuals and vulnerability as the potential for harm to individuals. Within the realm of forest tourism, considering that tourists are more inclined to cater to their mental health than physical health, severity is defined as the extent of harm that mental health issues may cause to an individual's overall health, professional endeavors, and personal life when forest tourism is not engaged. Meanwhile, vulnerability is described as the probability that the mental health issues perceived by tourists could lead to harm in their health, work, and life if forest tourism is not undertaken.

Beh et al. (2021) noted that perceptions of severity are rooted in fear. In turn, burglaries have the potential to instill a strong fear of losing belongings within any household. Consequently, an increase in the perceived severity of such incidents correlates with a heightened intention to utilize IoT devices (Dupuis and Ebenezer, 2018). This heightened sense of severity has similarly been observed to positively influence individuals' inclinations to embrace protective technologies (Chenoweth et al., 2009), adopt smart watches (Al-Emran et al., 2021), and embrace wearable technology (Gao et al., 2015). Consequently, it is anticipated that the severity associated with burglaries could drive the adoption of VR (Mahmud, et al., 2023)

H1. Threat Severity has a significant effect for Acceptance to use Virtual reality glass.

-Threat vulnerability:

Individuals perceiving themselves as vulnerable to a threat often take measures to mitigate the associated risks (Zhang et al., 2018). Dupuis and Ebenezer (2018) supported this argument, asserting that heightened vulnerability correlated with increased adoption of IoT devices. Moreover, this attribute has exhibited a favorable impact on individuals' inclinations to embrace smartwatches (Al-Emran et al., 2021), safeguarding against identity theft (Ogbanufe and Pavur, 2022), and wearable technology (Gao et al., 2015; Mahmud, et al., 2023).

H2. Threat vulnerability has a significant effect for Acceptance to use Virtual reality glass

-Response efficacy:

Response efficacy influences decisions regarding risk-reducing behaviors (Shafiei &Maleksaeidi, 2020). Response efficacy refers to individuals' perception of the effectiveness of recommended risk prevention behaviors (Janmaimool, 2017).

Interestingly, an upsurge in the adoption of IoT devices was driven by enhanced response efficacy (Dupuis and Ebenezer, 2018). Similarly, Jun et al. (2019) affirmed that strong response efficacy significantly increased the likelihood of technology adoption. Furthermore, individuals' inclinations to embrace various technologies were notably influenced by response efficacy such as wearable devices (Sergueeva and Shaw, 2017), smartwatches (Al-Emran et al., 2021). Consequently, based on this premise, the following hypothesis can be projected: (Mahmud, et al., 2023).

H3. Response Efficacy has a significant effect for Acceptance to use Virtual reality glass

-Self-efficacy:

Increased self-efficacy, as per Ophoff and Lakay (2019), enhanced the inclination to safeguard against potential threats. Moreover, this factor has been identified to positively influence users' inclinations to adopt various technologies, encompassing protective technologies (Chenoweth et al., 2009), wearable technology (Gao et al., 2015), information systems (Wiafe et al., 2020), mobile warning systems (Fischer-Preßler et al., 2022), and smart phone security (Mahmud, et al., 2023;Verkijika, 2018). This was substantiated by Dupuis and Ebenezer (2018), who provided evidence supporting the notion that heightened self-efficacy led to increased adoption of IoT systems.

H4. Self-Efficacy has a significant effect for Acceptance to use Virtual reality glass.

-Fear:

Cisler et al. (2009), defined fear as a critical emotional state that motivates individuals to take measures to mitigate harm from a specific threat. Particularly, fear drives individuals to treat the risk with greater seriousness, thereby stimulating their protective responses against the threat (Chen & Yang, 2019; Li, et al., 2023)

H5. Fear has a significant effect on Intention for Acceptance to use Virtual reality glass

-Trust School:

Trust in service provider's initiations encapsulates individuals' confidence in the information reliability and competence in managing the activities (Li et al., 2023; Zheng et al., 2022; Zhang et al., 2022). As posited by Shanka and Menebo (2021), trust in government signifies an inclination to place trust in the directives issued by local authorities concerning COVID-19.

Notably, empirical evidence validating the role of trust in government in bolstering response efficacy and self-efficacy has been observed by Zhang et al. (2022) within the context of disaster preparedness, indirectly supporting the potential for trust in government to enhance the response efficacy and self-efficacy of destination residents in this research.

H6.Trust School has a significant effect for Acceptance to use Virtual Reality glass

-Acceptance to use Virtual Reality Glass:

Consumer attitudes originate from their comprehension of various elements or actions, subsequently impacting their emotions, consequently shaping behavioral tendencies. Specifically, attitudes towards particular behaviors govern an individual's intentions to act (Teare, 1990). Within the framework of Protection Motivation Theory (PMT), evaluating threats and possible responses represents cognitive facets. In the context of forest tourism, tourists' evaluations of stress and negative emotions can influence their sentiments and feelings regarding forest health preservation efforts, which constitute their "attitudes," subsequently influencing their actions behavioral aspect (Lin, et al., 2023).

-Sample Size:

The research focuses on students from grade 1 to grade 5 with a total of 875 students in a private school located in Alexandria, Egypt. A questionnaire was created to ask student's parents survey development.

The paper aims to understand the perception of parents about their children's usage of VR headsets in their education in primary schools in Egypt. A survey strategy was employed using an online questionnaire. A survey was developed in English using GoogleForms.875 participants were sent by email and Facebook to participate in this survey. The data collection period lasted for 60 days. Of the1100 Egyptian parent of children in primary schools,875 responses were valid.

The questionnaire involves all study variables and four demographic information. Twenty-three questions are placed in the questionnaire, and the Likert-type five level scales are employed. The options for each question using points 1 to 5 to represent extremely disagree, disagree, neutral, agree, and extremely agree, respectively. Table 1 shows the questionnaire questions.

Table1:Questionnaire Questions

Attribute	Category
Threat severity (Li, et al., 2023)	TS1: I think that Virtual Reality Glass is very harmful
	TS2: I think that the threat of Virtual Reality Glass is very serious
	TS3: I think that Virtual Reality Glass is of high risk
	TS4: I think that the threat of Virtual Reality Glass is very significant
	TV1: I will be at higher risk if my child use Virtual reality glass

Attribute	Category
Threat vulnerability(Li, et al., 2023)	
	TV2: My child will be more vulnerable to Virtual reality glasses because of the health's harm
	TV3: My child will be more easily harmed when using virtual reality glass
Response efficacy:	RE1: I think that school efforts to keep safe from Virtual reality glass will be effective
	RE2: I think that preventive measures to use virtual glass will be operated
	RE3: I think that it is less likely to be exposed to Virtual reality glass harms if performing the preventive measures
Self-efficacy (Li, et al., 2023)	SE1: I know how to take precautions against Virtual reality glass harms
	SE2: I know how to deal with the Virtual reality glass
	SE3: I am able to find ways to deal with Virtual reality glass
Fear (Li, et al., 2023)	F1: When thinking about the Virtual Reality Glass, I feel frightened
	F2: When thinking about the Virtual Reality Glass, I feel nervous

Attribute	Category
	F3: When thinking about the Virtual Reality Glass, I am frustrated
Trust School (Li, et al., 2023)	TRS1: I trust that school will make right decisions for the Virtual Reality Glass
	TRS2: I trust that school will do what is right for my child when using Virtual Reality Glass
	TRS3: I trust that school will look after my child when using Virtual Reality Glass
Acceptance to use Virtual reality glass	AU1—Given the opportunity, I will use Virtual Reality glass
	AU2—I am willing to continuously use Chatgpt in the near future.
	AU3—I am open to using Virtual Reality glass as a method to manage education.
	AU4—I intend to continuously use Virtual Reality glass in the future

4-Statistical Analysis and Results:

The research type is quantitative and the proposed model was constructed based on literature review. The target population was expressed as parents who have children in the primary stage of education from grades 1 to 5. Two statistical software, SPSS 25.0andAMOS23.0,were used to measure the proposed model variables relationships. The following tests are described descriptive analysis, reliability test, exploratory factor analysis and the confirmatory factor analysis were conducted.

This section describes the four-analysis developed to understand the factors effect on user intention to use VR glasses including the

following: descriptive analysis, reliability test, exploratory factor analysis and confirmatory factor analysis.

A-Descriptive Statistics:

Descriptive statistics are valid for further analysis after verifying incomplete questionnaire and data. Detailed descriptive statistics of respondents' characteristics are shown in Table 1.

Table1:Respondents'Profile

Attribute	Category	Frequency	Percent
Child Grade	1	340	38.8%
	2	232	27.5%
	3	103	11.7%
	4	125	14.2%
	5	75	8.5%
Gender	Male	53	6.0%
	Female	822	94.0%
Work	Working	308	35.2%
	Household	567	64.8%
Salary	Less than 10000	52	5.9%
	10,000-25,000	500	57.1%
	More than 25,000	323	36.9%
Total	Total	875	

B-Exploratory Factor Analysis(EFA):

The survey's reliability underwent testing through the application of Cronbach's alpha coefficient. Following the criteria set by Kannan and Tan (2015), it was stipulated that the Cronbach's alpha coefficient should register at least 70% to validate reliability. To examine the exploratory factor, three assumptions were employed as proposed by Marsh and Hocevar (1985): the Kaiser–Meyer–Olkin measure should surpass 0.5; each factor should have a minimum value; and given the sample size, a factor loading of 0.50

or higher is appropriate. Upon scrutinizing the pattern matrix resulting from the exploratory factor analysis (EFA), it was ascertained that all items exhibited factor loadings greater than 0.50, as detailed in Table 2.

Table 2:EFA

Latent Variable	Item	Factor Loading	Composite Reliability CR	Cronbach' salpha	Average Variance Extracted AVE
Threat Severity	TS1	0.983	0.981	0.899	0.962
	TS2	0.964			
	TS3	0.921			
	TS4	0.719			
Threat Vulnerability	TV1	0.762	0.741	0.812	0.759
	TV2	0.751			
	TV3	0.729			
Response Efficacy:	RE1	0.846	0.839	0.831	0.840
	RE2	0.831			
	RE3	0.829			
Self-Efficacy	SE1	0.717	0.750	0.731	0.766
	SE2	0.721			
	SE3	0.732			
Fear	F1	0.976	0.957	0.922	0.946
	F2	0.915			
	F3	0.941			

Latent Variable	Item	Factor Loading	Composite Reliability CR	Cronbach' salpha	Average Variance Extracted AVE
Trust School	TRS 1	0.862	0.875	0.832	0.859
	TRS 2	0.872			
	TRS 3	0.873			
Acceptance to Use virtual reality glass	AU1	0.872	0.855	0.872	0.816
	AU2	0.862			
	AU3	0.877			
	AU4	0.831			

C-Conformity Factor Analysis(CFA):

Confirmatory factor analysis (CFA) is a statistical method used to establish the factor structure of observed variables. The model's relative Chi-Square value was 4.802, which is smaller than the recommended threshold of 5.0 according to (Marsh and Hocevar,1985). Additionally, the comparative fit index (CFI) stands at 0.953, surpassing the threshold proposed by (Bentler, 1990). The root mean residual (RMR) value of 0.033 is below the 0.08 limit as defined by (Hu and Bentler,1998).

The model's goodness of fit index (GFI) is 0.958, exceeding the recommended value of 0.90 as suggested by (Joreskog and Sorbom,1993). Moreover, the adjusted goodness of fit index (AGFI) was determined to be 0.879, aligning with the threshold set forth by (Anderson and Gerbing, 1984). The root mean square error of approximation (RMSEA) is 0.072, falling below the suggested fit value by (Browne and Cudeck,1993). Finally, the standardized root mean square residual (SRMR) is 0.051, lower than the 0.035 recommended by (Browne and Cudeck,1993). Table 3 details the fit of the confirmatory factor analysis model.

Table3:Confirmatory Factor Analysis Model Fit

Model Fitting Index	Value	Level of Acceptance
Chi-square/df	4.763	<5.0
Comparative fit index(CFI)	0.980	>0.90
Root mean residual(RMR)	0.021	<0.08
Goodness of fit index(GFI)	0.942	>0.90
Adjusted goodness of fit index(AGFI)	0.882	>0.85
Root mean square error of approximation(RMSEA)	0.061	<0.08
Standardizeds means square residual (SRMR)	0.029	<0.08

Structural equation modeling was utilized to identify the significant relationships acceptance to use VR headsets. After validating the measures of the model, research hypotheses were tested using the bootstrapping approach using the PLS-SEM.

The findings indicate that threat severity hasa significant impact on acceptance to use virtual reality glass(β=0.166,t=3.794,p=0.000).Thus,H1is valid.

On the other hand, the findings show that threat vulnerability has an insignificant influence when it comes to accepting the use of VR headsets (β=0.912,t=5.812,p=0.482),indicating that H2 is invalid. The findings showed that response efficacy(β=0.382,t=1.582,p=0.001).

Thus, H3is valid. In addition, the results show that self-efficacy in significant impact on acceptance to use VR headsets (β=0.185,t=0.258,p=0.340). Therefore, H4 is not valid. Moreover, H5 is valid as it demonstrates that fear has a significant impact on the acceptance to use VR headset (β=0.981,t=3.709,p=0.000).Moreover, the results indicated trust school has a significant impact (β=0.895, t=0.701, p=0.000).Table4 represents path coefficient and significance.

Table4: Path Coefficient and significance

Path	Hypothesis	Path Coefficient B	t-value	Significance Value(p)	Results
AU←TS	H1	0.166	3.794	0.000	√
AU←TV	H2	0.912	5.812	0.482	X
AU←RE	H3	0.382	1.582	0.001	√
AU←SE	H4	0.185	0.258	0.340	X
AU←F	H5	0.981	3.709	0.000	√
AU←TRS	H6	0.895	0.701	0.000	√

D-Discussion of Results:

The study investigates parental acceptance regarding the utilization of VR headset within primary education's instructional process. The research findings hold significance for several reasons. Primarily, this paper contributes theoretically to the integration of virtual reality in education by assessing the impact of employing virtual reality technologies on the educational process. Mainly, it focuses on PMT model with these variables: threat severity, threat vulnerability, response efficacy, self-efficacy, fear, and trust school. This paper invites further research in Egypt that focuses on virtual reality, new technologies in education and learning process.

Different previous researchers focused on understanding the advantages and barriers of using virtual reality technology in in education (Lainem et al., 2023;Bailenson et al., 2008; Rho et al., 2020; Ma, 2021; Peixoto, et al., 2021; Mystakidis, 2020).

Results of the analysis show that threat severity, response efficacy, fear and trust school are significant to the acceptance of using VR headsets, which is similar to the following researchers' results (Li, et al., 2023; Al-Emran et al., 2021; Mahmud, et al., 2023;

Zhang et al. 2022).On the other hand, self-efficacy and threat vulnerability are not significant which also stated in (Mahmud, et al., 2023).

Results are different from (Peixoto, et al., 2021, Ma,2021) since they used virtual reality in teaching English for college students. The student type is different and the tool is different. In addition, the university level and the primary level offer different perspectives.

Finally, the findings showed that fear and trust school are important variables in which parents do not know the interaction between VR tools and children. Furthermore, they are afraid for their children's health and communication with such tools.

5-Conclusion:

A-Academic Implication:

The study holds significant implications as it delves into the factors influencing parental acceptance of employing VR headsets within primary education, particularly their willingness to allow their children to use this tool under the guidance of a human teacher. This research bears relevance for academic scholars engaged in both the educational and technological sectors, offering valuable insights into the acceptance of using virtual reality glasses in primary education.

In Egypt, there is a limited focus among researchers on virtual reality, a new educational technology facing resistance from families and students. Parents struggle to grasp how virtual reality can integrate into the lives of Egyptian citizens. While existing literature predominantly concentrates on virtual reality in gaming. This research primarily aims to comprehend parental perspectives on integrating VR headsets within primary education.

The recommendations derived from this research are as follows: it suggests that VR tools have the potential to enrich the education system. Moreover, parents displayed acceptance toward the use of VR headsets, albeit within specific time constraints, to support their children in primary education. It also highlights the importance of a human teacher monitoring students' attitudes while they engage with VR headsets.

B-Practical Implication:

This research provides vital insights into education sector. Research model is created from factors that are extracted from previous research such as threat severity, threat vulnerability, response efficacy, self-efficacy, fear, and trust school. Based on a sample of 875 respondents, the findings revealed that using VR headsets is accepted from the parents' side. threat severity, response efficacy, fear, and trust school affect significantly the parent acceptance to use virtual reality glass.

Virtual reality is a powerful technological tool for the education process. VR with some enhancements can assist human teachers in the education process.

6-Limitation and Future work:

The limitations of this research can be outlined as follows. Firstly, the sample size, limited to 875 participants, which requires expansion for a more comprehensive understanding of parental opinions and factors influencing their intention to use virtual reality glasses. Second, a comparative study across European countries could yield intriguing results by testing these variables in diverse cultural settings.

Future research avenues could explore parental attitudes towards VR headsets in different regions, such as Gulf countries, renowned for their extensive experience in the education sector. Additionally, while this research employed a quantitative approach through an online questionnaire, future studies could incorporate qualitative research methodologies, like interviews, to delve deeper into the factors influencing acceptance of VR headsets and provide a richer understanding of this decision-making process.

-Reference:

Al-Emran, M., Grani c, A., Al-Sharafi, M., Ameen, N. and Sarrab, M. (2021), "Examining the roles of students' beliefs and security concerns for using smartwatches in higher education", Journal of Enterprise Information Management, Vol. 34 No. 4, pp. 1-23, doi: 10.1108/JEIM-02-2020-0052.

Anderson, J. and Gerbing, D.(1984). The effect of sampling error on convergence, improper solutions, and goodness-of-fit indices for maximum likelihood confirmatory factor analysis,Psychometrika, 49(2),155-173,1984.

Bailenson, N. Yee, J. Blascovich, A. Beall, N. Lundblad, N. Jin,M.(2008). The use of immersive virtual reality in the learning sciences: Digital transformations of teachers, students, and social context The Journal of the Learning Sciences, 17 (1) (2008),

Barrie,M.,Socha,J., Mansour,L., Patterson,E.(2019). Mixed reality in medical education: A narrative literature review Proceedings of the International Symposium on Human Factors and Ergonomics in Health Care, 8 (1)

Beh, P.K., Ganesan, Y., Iranmanesh, M. and Foroughi, B. (2021), "Using smartwatches for fitness and health monitoring: the UTAUT2 combined with threat appraisal as moderators", Behaviour and Information Technology, Vol. 40 No. 3, pp. 282-299.

Bentler, P. (1990).Comparative fit indexes in structural models, Psychological Bulletin,107(2), 238-246.

Berthoud, L.,Walsh, J. (2020).Using visualisations to develop skills in astrodynamics. Eur. J. Eng. Educ. 2020, 45, 900–916.

Browne, M. and Cudeck, R.(1993).Alternative ways of assessing model fit, Sage Focuses Editions, 154, 126-136.

Buttussi, F., and Chittaro, L. (2021). A Comparison of Procedural Safety Training in Three Conditions: Virtual Reality Headset, Smartphone, and Printed Materials. IEEE Transactions on LearningTechnologies, 14(1), 1-15, Article 9239901. https://doi.org/10.1109/TLT.2020.3033766

Chen, L., and Yang, X. (2019). Using EPPM to evaluate the effectiveness of fear appeal messages across different media outlets to increase the intention of breast self-examination among Chinese women. Health Communication, 34(11), 1369–1376

Chen, Y.WangX., Xu,H.(2021).Human factors/ergonomics evaluation for virtual reality headsets: a review CCF Trans. Pervasive Comput. Interaction, 3 (2) (2021), pp. 99-111,

Chenoweth, T., Minch, R. and Gattiker, T. (2009), "Application of protection motivation theory toadoption of protective technologies", 42nd HI International Conference on System Sciences, Waikoloa, USA, pp. 1-10, doi: 10.1109/HICSS.2009.74.

Cisler, J. M., Olatunji, B. O., Lohr, J. M. (2009). Disgust, fear, and the anxiety disorders: A critical review. Clinical Psychology Review, 29(1), 34–46.

Crossler, R., Long, J., Loraas, T., Trinkle, B.(2014). Understanding compliance withbring your own device policies utilizing protection motivation theory: bridging the intentionbehavior gap. J. Inf. Syst. 28, 209–226 (2014). https://doi.org/10.2308/ISYS-50704

Deslauriers, L. McCarty, L.,Miller, K.Callaghan, K.Kestin,G.(2019) Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom.Proceedings of the National Academy of Sciences of the United States of America, 116 (39)

Dupuis, M. and Ebenezer, M. (2018), "Help wanted: consumer privacy behavior and smart home Internet of Things (IoT) devices", 19th Annual SIG Conference on Information Technology Education, Fort Lauderdale, USA, pp. 117-122, doi: 10.1145/3241815.3241869.

Fer, S., 2011. Learning teaching theories and approaches. Ankara: Anı Yayıncılık.

Fischer-Preßler, D., Bonaretti, D. and Fischbach, K. (2022), "A protection-motivation perspective to explain intention to use and continue to use

mobile warning systems", Business and Information Systems Engineering, Vol. 64 No. 2, pp. 167-182, doi: 10.1007/s12599-021-00704-0.

Freitas, L.,Ancioto, A., de Fátima Rodrigues Guimarães, R.,Martins, V., Dias, D., de Paiva Guimarães, M. (2020).A Virtual Reality Simulator to Assist in Memory Management Lectures, Lecture Notes in Computer Science. In Proceedings of the International Conference on Computational Science and Its Applications, Cagliari, Italy, 1–4 July 2020; pp. 810–825

Gao, Y., Li, H. and Luo, Y. (2015), "An empirical study of wearabletechnology acceptance inhealthcare", Industrial Management

Gloy, K.;Weyhe, P.; Nerenz, E.; Kaluschke, M.; Uslar, V.; Zachmann, G.;Weyhe, D. Immersive anatomy atlas: Learning factual medical knowledge in a virtual reality environment. Anat. Sci. Educ. 2021, 15, 360–368.

Gybas,V., Klubal,L., and Kostolányová,K(2019).Individualization with tablets in the Czech Republic - SPECIAL PRIMARY SCHOOLS.15th International Conference Mobile Learning

Halan, D.(2020). E-tailers adaptation during early stages of socialdistancing causing crises: anexploratory study. Int. J. Retail Distrib. Manag. 49, 1554–1570 (2021). https://doi.org/10. 1108/IJRDM-11-2020-0475

Hu, L. & Bentler, P. Fit indices in covariance structure modeling: sensitivity to underparameterized model misspecification, Psychological Methods,. 3(4), 424-453,1998.

Huang, X.; Zou, D.; Cheng, G.; Xie, H.(2021). A systematic review of AR and VR enhanced language learning. Sustainability 2021, 13, 463

Huo, C., Zhang, M.,Ma, F.(2018). Factors influencing people's health knowledge adoption in social media: the mediating effect of trust and the moderating effect of health threat. Libr. Hi Tech. 36, 129–151 (2018). https://doi.org/10.1108/LHT-04-2017-0074

Jamshidifarsani,.H. Garbaya,S. Lim, P. Blazevic,P., Ritchie,J.(2019). Technology-based reading intervention programs for elementary grades: An analytical review Computers and Education, 128, pp. 427-451

Janmaimool, P. (2017). Application of Protection Motivation Theory to Investigate Sustainable Waste Management Behaviors. Sustainability, 9(7), 1079. https:// doi. org/ 10. 3390/ su907 1079

Johnson-Glenberg,M.(2018). Immersive VR and education: Embodied design principles that include gesture and hand controls Frontiers in Robotics and AI, 5 (2018

Joreskog, K. and Sorbom, D.(1993). LISREL 8: Users' Reference Guide, Scientific SoftwareInternational.

Jun, J., Park, H. and Cho, I. (2019), "Study on initial adoption of advanced driver assistance system: integrated model of PMT and UTAUT 2", Total Quality Management and Business Excellence, Vol. 30 No. sup1, pp. 1-15, doi: 10.1080/14783363.2019.1665820.

Kannan, V., and Tan, K.(2015). Just in time, total quality management, and supply chainmanagement: Understanding their linkages and impact on business performance. Omega 33(2), 153–162, (24).

Kwasnicka, D., Dombrowski, S.U., White, M., Sniehotta, F.(2016). Theoretical explanations formaintenance of behaviour change: a systematic review of behaviourtheories. Health Psychol.Rev. 10, 277–296 (2016). https://doi.org/10.1080/17437199.2016.1151372

Lainem,J., Korhonen,T. , Hakkarainen,K. (2023) Primary school students' experiences of immersive virtual reality use in the classroom, Cogent Education, 10:1,2196896,

LaValle, S. M. (2023). Virtual reality. Cambridge university press. ISBN: 1107198933

Lee, H.; Hwang, Y.(2022) Technology-Enhanced Education through VR-Making and Metaverse-Linking to Foster Teacher Readiness and Sustainable Learning. Sustainability , 14, 4786. https:// doi.org/10.3390/su14084786

Li,S. , , XiaoMa,C. and Sun,Z.(2023).Applying an Extended Protection Motivation Theory Model to Predict Resident Hospitality During theCOVID-19 Crisis.Journal of Travel Research1–18, Sage.

Liang, H., Xue, Y.(2010). Understanding security behaviors in personal computer usage: a threat avoidance perspective. J.Assoc. Inf. Syst. 11, 394–413 (2010). https://doi.org/10.17705/1jais. 00232

Lin, W., Lin,Q., Tang,D.,Yan,Y.(2023). A study on the factors influencing the intention to revisit forest tourism based on PMT-TPB?.Current Psychology

Ma, L. (2021).An immersive context teaching method for college English based on Artificial Intelligence and machine learning in Virtual Reality Technology. Mob. Inf. Syst. , 2021, 2637439

Mahmud,A.,Yusoff,M., and Husin,M,.(2023).Generation Z's adoption of IoT: protection motivation theory as the underlying model and gender as a moderator Information Technology Vol. 25 No. 2, 2023 pp. 133-159

Marsh, H. and Hocevar, D.(1985). Application of confirmatory factor analysis to the study of selfconcept: first-and higher order factor models and their invariance across groups, PsychologicalBulletin, 97,(3)562-582.

Moody,G., Polak, P. (2015).What do systems users have tofear?Usingfear appealsto engender threats and fear that motivateprotectivesecuritybehaviors.MIS Q. Manag. Inf. Syst. 39, 837–864

Mostafa L. (2020) Student Sentiment Analysis Using Gamification for Education Context. In: Hassanien A., Shaalan K., Tolba M. (eds) Proceedings of the International Conference on Advanced Intelligent Systems and Informatics 2019. AISI 2019. Advances in Intelligent Systems and Computing, vol 1058. Springer, Cham. https://doi.org/10.1007/978-3-030-31129-2_30

Mostafa L., Elbarawy A. (2018). Enhance Job Candidate Learning Path using Gamification , ICCTA18 Proceedings Of 28th International Conference On Computer Theory And Applications, Alexandria, Egypt

Mostafa, L. (2022).Measuring Technology Acceptance Model to use Metaverse Technology in Egypt . Journal of Finance and Business Research, Portsaid University, Volume 23, Issue 3, July 2022, Page 118-142 DOI: 10.21608/jsst.2022.130606.1398

Mostafa, L., Beshir, S. (2022). Using Gamification in Egyptian E-Government. In: Hassanien, A.E., Snášel, V., Tang, M., Sung, TW., Chang, KC. (eds) Proceedings of the 8th International Conference on Advanced Intelligent Systems and Informatics 2022. AISI 2022. Lecture Notes on Data Engineering and Communications Technologies, vol 152. Springer, Cham. https://doi.org/10.1007/978-3-031-20601-6_31.

Mostafa,L.(2023).Evaluating university E-assessment in Egypt: A teachers' perspective, Journal of Education for Business, 98:7, 395-403, DOI: 10.1080/08832323.2023.2208813.

Mystakidis, S.(2020). Distance education gamification in social virtual reality: A case study on student engagement. In Proceedings of the 2020 11th International Conference on Information, Intelligence, Systems and Applications (IISA), Piraeus, Greece, 15–17 July 2020.

Ogbanufe, O. and Pavur, R. (2022), "Going through the emotions of regret and fear: revisiting protection motivation for identity theft protection", International Journal of Information Management, Vol. 62 No. C, p. 102432.

Ophoff, J. and Lakay, M. (2019), "Mitigating the ransomware threat: a protection motivation theory approach", 17th International Conference on Information Security, Pretoria, South Africa, pp. 163-175, doi: 10.1007/978-3-030-11407-7.

Paes, D., Irizarry, J., Pujoni, D. (2021). An evidence of cognitive benefits from immersive design review: Comparing three-dimensional perception and presence between immersive and nonimmersive virtual environments. Automation in Construction, 130.

Pande, P.; Thit, A.; Sørensen, A.E.; Mojsoska, B.; Moeller, M.E.; Jepsen, P.M.(2021). Long-term effectiveness of immersive VR simulations in undergraduate science learning: Lessons from a media-comparison study. Res. Learn. Technol. 2021, 29, EJ1293535

Peixoto, B.; Pinto, R.; Melo, M.; Cabral, L.; Bessa, M. (2021).Immersive virtual reality for foreign language education: A PRISMA Systematic Review. IEEE Access 2021, 9, 48952–48962.

Prathap,C. (2020). Continuance adoption of mobile-based payments inCovid-19 context:an integrated framework of health belief model and expectation confirmationmodel. Int. J.PervasiveComput. Commun. 16, 351–369(2020).https://doi.org/10.1108/IJPCC-06-2020-0069

Rendevski, N., Trajcevska, D., Dimovski, M., Veljanovski, K., Popov, A., Emini, N., Veljanovski, D.(2022). PC VR vs Standalone VR Fully-Immersive Applications: History, Technical Aspects and Performance. 2022 57th International Scientific Conference on Information, Communication and Energy Systems and Technologies (ICEST),

Rho, E.; Chan, K.; Varoy, E.J.; Giacaman, N. (2020).An experiential learning approach to learning manual communication through a virtual reality environment. IEEE Trans. Learn. Technol. 2020 13, 477–490.

Rogers, R. W. (1975). A Protection Motivation Theory of Fear Appeals and Attitude Change. The Journal of Psychology, 91(1), 93–114. https:// doi. org/ 10. 1080/ 00223 980. 1975. 99158 03.

Scorgie D, Feng Z, Paes D, Parisi F, Yiu T.W., Lovreglio R. (2023).Virtual Reality forSafety Training: A Systematic Literature Review and Meta-Analysis, Safety Science.

Seow,A.N., Choong,Y.O., Choong, C.K.,Moorthy, K.(2021).Health tourism: behavioural intention and protection motivation theory.Tour Rev. (2021). https://doi.org/10.1108/TR-11-2020-0546

Sergueeva, K. and Shaw, N. (2017), "Improving healthcare with wearables: overcoming the barriers to adoption", LectureNotes in Computer Science, Vol. 2017, pp. 209-223, doi: 10.1007/978-3-319-58481-2_17.

Shafiei, A.,and Maleksaeidi, H. (2020). Pro-environmental behavior of university students: Application of protection motivation theory. Global Ecology and Conservation, 22, e00908. https:// doi. org/ 10.1016/j. gecco. 2020. e00908

Shanka, S., and Menebo, M. (2021). When and how trust in government leads to compliance with COVID-19 precautionarymeasures. Journal of Business Research, 139, 1275–1283.

Singh, G., Aiyub, A.S., Greig, T.(2021). Exploring panic buyingbehavior during the COVID-19 pandemic: a developing country perspective. Int. J. Emerg. Mark. (2021). https://doi.org/ 10.1108/IJOEM-03-2021-0308.

Teare, R. (1990). International Journal of Contemporary Hospitality-Management. Marketing Intelligence & Planning, 8(5), 12–14.https:// doi. org/ 10. 1108/ EUM00 00000 001079.

Verkijika, S. (2018), "Understanding smartphone security behaviors: an extension of the protection motivation theory with anticipated regret", Computers and Security, (August), Vol. 77, pp. 860-870, doi: 10.1016/j.cose.2018.03.008.

Wiafe, I., Koranteng, F., Tettey, T., Kastriku, F., and Abdulai, J. (2020), "Factors thataffect acceptance and use of information systemswithin the Maritime industry indeveloping countries", Journal of Systems and Information Technology, Vol. 22 No. 1, pp. 21-45.

Wong, T., Gaston, A., DeJesus, S., Prapavessis, H.(2016).The utility ofa protection motivationtheory framework for understanding sedentary behavior.

Heal. Psychol. Behav.Med. 4, 29–48 (2016). https://doi.org/10.1080/21642850.2015.1128333.

Zhang, F., Bao, X., Deng, X., Wang, W., Song, J., and Xu, D. (2022). Does trust help to improve residents' perceptions of the efficacy of disaster preparedness? Evidence from Wenchuan and Lushan earthquakes in Sichuan Province, China. International Journal of Environmental Research and Public Health, 19, 4515.

Zhang, X., Liu, S., Chen, X., Wang, L., Gao, B. and Zhu, Q. (2018), "Health information privacy concerns, antecedents, and information disclosure intention in online health communities", Information and Management, Vol. 55 No. 4, pp. 482-493.

Zheng, D., Luo, Q., and Ritchie, B. W. (2022). The role of trust in mitigating perceived threat, fear, and travel avoidance after a pandemic outbreak: A multigroup analysis. Journal of Travel Research, 61(3), 581–596.