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Augmented and Virtual Reality and Consumer Engagement in Education Sector: An Empirical Analysis

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Abstract:

Purpose-The study examines the result of the recent AR / VR marketing technologies on consumer engagement providing strategies to design an ironic and immersive atmosphere that is able to bring high-impact and unforgettable learning and teaching experience skills to the new real world.

Methodology- The study uses structural equation modeling to assess the relationships among the proposed constructs. The sample were the students from Bangalore region and an e-questionnaire was sent to them for collection of the data.

Results, Findings & Analysis- The study proves that the adoption of AR / VR technology improves the learning skills and it is really advantages to invest both time and financial resources. By using of technological tools in education such as AR / VR improves the student's creativity thinking skills, communicating style, problem solving capability, which is known as so-called-21st-century skills, these are really necessary to transform the material rather than just receive it.

Conclusion and Practical Implications- The growing level of consumer engagement, and self-learning, accepting multi-sensory technology learning skills, imagination level that converting real things into imaginary world are all bringing new era in education sector by using AR/VR marketing.

Keywords: Augmented reality, Virtual reality, Consumer engagement, social media, and education sectors.

Introduction:

During the recent past, world has become digital in its all facets. The emergence of digital era has creating brand transparency among the consumers today (Mbama & Ezepue, 2018). By adoption of this changes in all the business sectors consumers are empowered so much so that will be replaceable of everything for them. Consumers are expressing new implications in different products, different services, and all other different things by adoption of digital platform (Kumar et al., 2020). The rapid growth of technologies are creating necessary things and it boost the adaptation of social media involves of a different web-based tools which permit their consumers to mete out and to share their ideas, thinking's, thoughts, and information in a further communicating and cybernetic environment (Esam & Hashim, 2016).

Students adopted and exploring themselves in this growing digital era by using new technologies (Lim, Agostinho, Harper, & Chicharo, 2014) by using of this technology provides them to think in unique way and also adoption of technologies will provide unique opportunities for self-learning and interactions (Sarwar, Zulfiqar, Aziz, & Chandia, 2018). The social media is connecting new generation individuals to adopt and reconnect to the academic institutions by networked knowledge (Junco, Heibergert, & Loken, 2011).

To improve the students learning skills and understanding level of concepts; the education sector moved very forward in spite of adoption of technological things. The technological tools such as Augmented and Virtual reality it improves the digital knowledge, creative thinking etc. Using of AR / VR technology in the education students can experience and they can compare the real things into imaginary things. The imaginary objective things leads to students learn faster than old traditional education system. The AR / VR affects the student's holding and memory (Zarzo, 2015). AR / VR helps to increase the visuospatial skills of students (OECD, 2011) and the VR technology creates the positive feelings in the learning skills.

The present study attempted to investigate the influence of AR/VR marketing activities on consumers' engagement and their intention to use. The analysis was done using SPSS (Ver 20) and AMOS software. The study attempted to assess the

direct influence of AR/VR marketing on consumers' engagement and intention to use, and direct influence of consumers' engagement on intention to use. The study further tried to verify the indirect role of consumers' engagement on the relationship between AR/VR marketing and intention to use. The following sections discusses the literature review followed by the data analysis and discussions and conclusion of the study.

Literature review:

(Papanastasiou, Drigas, Skianis, Lytras, & Papanastasiou, 2018) , Acknowledges that the virtual reality and augmented reality approaches the students to learn with new skills to the new real world. The augmented and virtual reality technological tools improves the digital-age-literacy, imaginative thinking, communication abilities, collaboration and problematic cracking capability, and these are considered as so-called-twenty-first era skills, and these are very much important transform the data rather than just getting it. Implication AR / VR marketing tools in educational sector leads to provide an effective tool to enhance learning and memory, as they provide deep multimodal atmospheres enriched by several sensory features. Adoption of this technical tools increase the art of memory (Zarzo, 2015) . The effects of Virtual reality creates an 3D effects and it is very important tool of making people learn in education environment by using digital tools and creates the interactive level highly (Mikropoulos & Natsis, 2010).

According to (Crittenden, Biel , & Lovely, 2019), digital change is growing like faster than tsunami. The digital usage in education sector creates sensory skills and improved digital activities and which will lead to better learning. All the business sectors including educational organizations started adopting new and unique applications and technology. Few of the companies like Nokia, Sony etc., are failed in the market because of them did not implemented the technology changes (Crittenden, Biel, & Lovely, Embracing Digitalization: Student Learning and New Technologies, 2018).

In this view point, (Rasool, Shah, & Islam, 2020) the world is moving through digital transformation. The exposure of this digital era is promoting brand transformation along with its growth. In such a growing web-working era, consumers are authorized so much and it leads to replace the things into digital like; any kind of services, any kind of products, and required content. By moving along with web technologies so many technological advancements are introducing in every sectors such as Augmented Reality, Virtual Reality, Big Data, and Artificial Intelligence. Adopting this kind of technologies by using networking podiums have become a fundamental part of consumer's survives and life style. Consumers are becoming progressively capable using developing communication daises. The area of online consumer engagement has fully-fledged hastily in the earlier few ages. It moved into all the sectors from service industry to education industry.

Augmented reality

In a comprehensive overview (Kesim & Ozarslan, 2012) the augmented reality offers many unique ways of both physical and virtual world. The logic behind of the AR is without replacing the real world people will experience the imaginary world. AR technology tools provides the computer generated virtual feel as like as real incidents. Adoption of this technological tools in the education system the organization can offer student's unbroken interaction with the real world. AR operates by recording the physical world and inverting live visual objects, animations, messages, details, or sounds that the user sees on the screen of a monitor, smartphone, tablet, glasses, headphones, or other on-screen display device. Geolocalization and integrated sensors (accelerometer, gyroscope) help to keep the physical world and interactive knowledge in line (Elmqaddem, 2019).

Augmented reality in Education:

AR technological tools is not a new problem. This tools has been used in many different areas such as; medical field, army, manufacturing sectors, robotic technology, maintenance and repair applications, physiological treatments, etc. (Azuma, Baillot, Behringer, Julier, & MacIntyre, 2001). The application of AR technologies could be applied to geometry classes, as well as the illustration of cells in biology, or the development of molecular structure simulations in PE teams (Asai, Kobayashi, & Kondo, 2005). Furthermore, using augmentation, any topic can be made more colorful, fascinating, and interactive. Furthermore, AR production or logical games may benefit education. In computer science classes, students can learn about the history of augmented reality and how it works. It helps to build their own augmented reality projects.

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Virtual Reality:

According to the American Heritage Dictionary, The virtual means "existing or having an effect in meaning or effect but not in real reality, shape, or name" (Fernandez, 2017). It is also "created, simulated, or conducted using a computer network and computer" (Virtual, 2005). VR is purely indicates the computer networks so this tool is using more in video game industry so it has been the major sponsor for development of this technology (Prieto, 2017).

Virtual Reality in Education:

Virtual technology has discovered a new area in which to show its maximum potential. Education includes all of the components necessary for this technology to not only add value, but also become an extreme differential value (Kumar, 2016). Implementing of this technological tool in education system the students will have greatest impact in learning the new skills to handle the technical situations and it helps them to learn to solve using acquired the theoretical knowledge and to understand the concepts (Falloon, 2010). As discussed previously, VR has been identified as one of the most promising resources for promoting learning outcomes. As such, it is critical to understand how to use VR in education and to take a close look at the applications that have been successfully implemented in classrooms (Lio, Bhagat, Gao, Chang, & Huang , 2017).

AR/VR Marketing and Consumer Engagement

According to (Hung, Chen, & Huang, 2016), augmented reality (AR) transforms learning by allowing students to visualize complicated spatial relationships and abstract concepts. AR increases learning outcomes in the same way as the most commonly used instructional materials (both picture books and physical encounters) do. AR not only aids learning but also enhances learning motivation more effectively than traditional teaching methods. AR teaching Material is an excellent substitute for traditional picture books and tactile interactions.

Based on the discussions in literature on the influence of online marketing on consumer engagement (Sung et al., 2021) and intention to use (Samsudeen & Kaldeen, 2020; Dastane, 2020), and influence of consumer engagement on intention to use (Addo et al., 2021; Bilal et al., 2021), we propose the following hypothesis for further empirical analysis.

H1: AR/VR marketing positively influences the consumer engagement.

H2: Consumer engagement positively influences the intention to use.

H3: AR/VR marketing positively influences the intention to use.

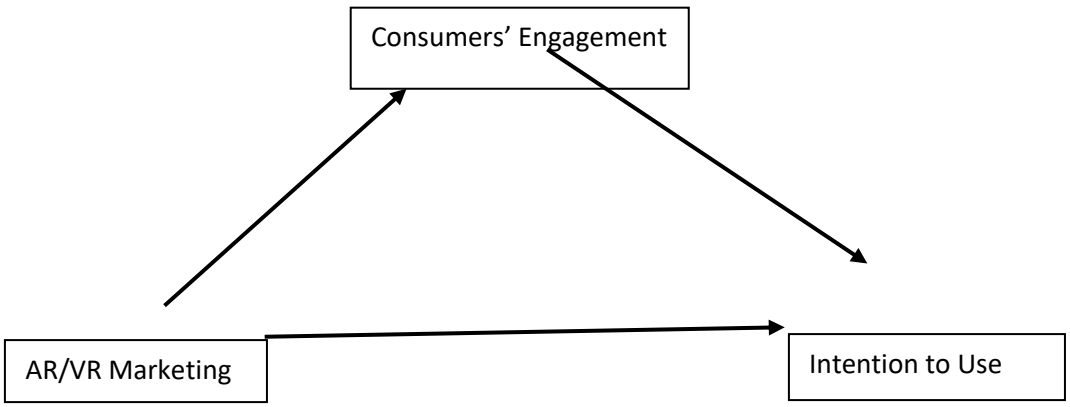

Figure1 Conceptual Framework

Method

The general aim of this study is to identify the impact of AR/VR marketing on customer engagement and intention to use among the students in Bangalore, India. Sample size taken for the current study is 131. An organized survey with 7-point

Likert scale was prepared for collecting primary data for the study. Students using online platforms for their academic learning and residing in Bangalore constitute the population of the research study.

Measures

For gathering the data, convenience sampling method was used. Questionnaire was sent to 240 respondents and 144 valid responses were obtained with a response rate of 60.0 per cent. Statements related to students' using online platforms were included in the questionnaire. The questionnaire is formed with two sections, with a total of 14 items, related to various aspects of consumer intention to use, consumer engagement and AR/VR marketing. A 7-point Likert scale was used in the questionnaire. The analysis was carried out by using factor analysis and to check the reliability of the factors, Cronbach's alpha was calculated using IBM SPSS 20.0 software.

Data Analysis:-

The reliability test results show that all the variables have Cronbach's alpha value greater than the recommended threshold of 0.7 for going ahead with the analysis. Hence, the validity of the data is confirmed for further analysis.

Table 1 Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.896	.898	14

Further, the data set shows an acceptable KMO and Bartlett's value i.e. 0.885, which is ideal for moving ahead with the factor analysis.

Table 2 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.837
Bartlett's Test of Sphericity	Approx. Chi-Square	1106.283
	Df	91
	Sig.	.000

Total variance explained is found to be 70.237, which is acceptable for further analysis. **Table 3** below shows the Eigen value and variance explained of the dataset used in the present study. Factor analysis using the SPSS package version 20 was performed and the data got reduced to five major constructs as shown in **Table 4**: The standard factor loadings of the items of the constructs were all above 0.5 and hence suitable for analysis.

Table 3 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.095	43.538	43.538	6.095	43.538	43.538	3.657	26.118	26.118
2	2.135	15.251	58.790	2.135	15.251	58.790	3.352	23.946	50.064
3	1.603	11.447	70.237	1.603	11.447	70.237	2.824	20.173	70.237
Extraction Method: Principal Component Analysis.									

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Table 4 Rotated Component Matrix[a]

	Component		
	1	2	3
CE05	.895		
CE04	.824		
CE02	.802		
CE01	.770		
CE03	.736		
ITU02		.830	
ITU05		.806	
ITU04		.771	
ITU01		.758	
ITU03		.736	
AV02			.824
AV04			.794
AV01			.791
AV03			.775
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 5 iterations.			

The first order measurement model of the data set using AMOS is depicted in Figure 2 below.

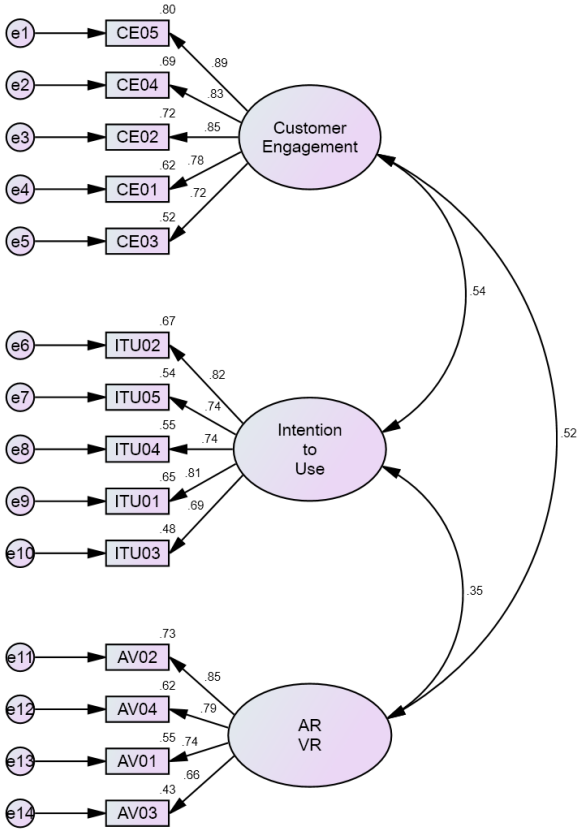

Figure 2 first order measurement model

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The second order (final) measurement model for the data set is shown in Figure 3 below and the indices found for the measurement model is satisfactory for further inference.

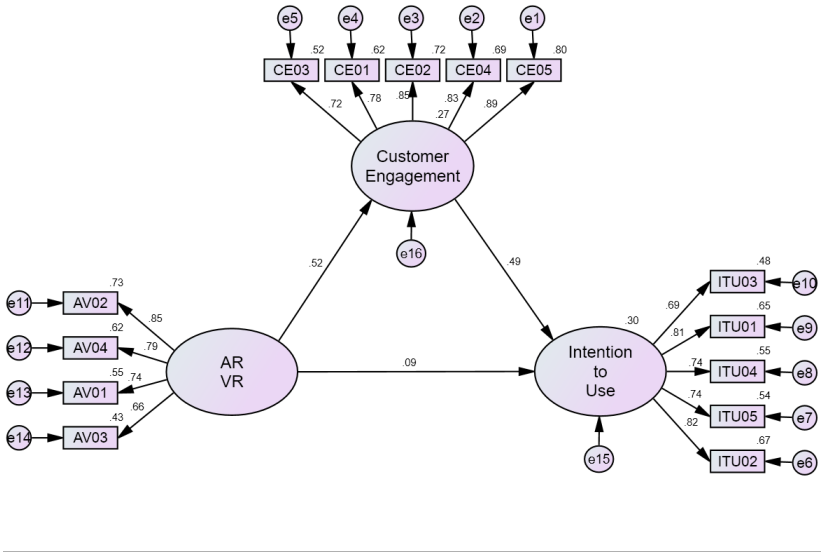

Figure 3 Second order measurement model

The measurement model indices values are within their recommended thresholds, χ^2/df (2.075); CFI (0.925); GFI (0.868); RMSEA (0.091); TLI (0.908)

R2 Value (Squared Multiple Correlations) for the below model is 0.30**.** It is assessed that the forecasters of intention to use online platforms for purchases explain 30.0 % of its variance.

Testing of Mediation effect

The study further tested the mediation effect of customer engagement on the relationship between ARVR marketing and intention to use. The analysis found existence of a significant mediation of customer engagement on consumers' intention to use the online platforms using ARVR marketing activities. The results of the mediation effect is shown in the Table 6 below.

Table 5 Standardized path coefficients between ARVR, Customer Engagement and Intention to Use

Relationship	Path Loadings	t-value	p-value
ARVR → Customer Engagement	0.517	5.479	***
ARVR → Intention to use	0.093	0.872	0.383
Customer Engagement → Intention to Use	0.494	4.525	***

*** Statistically significant (p<0.001)

Table 6 Direct and Indirect Effects

Relationship	Direct effect	Indirect effect	Total effect
ARVR → Customer Engagement	0.697***	-----	0.697***
ARVR → Intention to use	0.143 (NS)	0.393	0.536***
Customer Engagement → Intention to Use	0.564***	-----	0.564***

*** Statistically significant (p<0.001)

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Hypothesis Testing

Table 7 Hypothesis Testing

Hypothesis	**Independent Variable**	Dependent Variable	**Standardised Coefficient Paths**		**p-value**	**Assessment**
			Direct Path	**Critical ratio**		
H1	AR_VR	Customer_Engagement	0.517	5.479	***	**Supported**
H2	Customer_Engagement	Intention_to_Use	0.494	4.525	***	**Supported**
H3	AR_VR	Intention_to_Use	0.093	0.872	0.383	**Not Supported**

Note: Statistically significant at *** = 0.001 (t > 3.291); ** = 0.01 (t > 2.576); *=0.10 (t > 1.645) NS = Not significant

The path model above and the hypothesis testing Table 7, show that all the hypothesis proposed in the present study has been accepted with significant t-value and p-values. The model R2 value is found to be 0.30 suggesting that the model is 30.0 percent identifiable by the independent variables. This can be improved by including more samples in the study and spreading the study on more inclusive domains.

DISCUSSION

The present study targeted to understand the influence of AR/VR marketing on the consumers' intentions to use online platforms. The study explored three constructs namely AR/VR marketing, customer engagement and intention to use, and attempted to investigate the nature of their relationships. The study proposed four hypotheses in total to start the investigation. The investigation in the present study has used SEM for data analysis. The first three hypotheses were assessments for direct relationships between the constructs and the other one hypothesis was to assess the indirect effects of the constructs. The direct hypotheses have proposed the existence of a direct relationship between AR/VR marketing and customer engagement, AR/VR marketing and intention to use, customer engagement and intention to use (H1 – H3). The results of the study confirm the existence of direct and significant influence between the hypothesized relationships. The study findings suggest that AR/VR marketing activities positively and significantly impacts customer engagement and intention to use. Besides, the study also suggests that customer engagement do influence the consumers' intention to use online platforms positively and significantly in a direct way. The findings of the study add to the existing literature on online/ social media marketing and its influence of intention to use. The study finally fulfills the first objective of the study by empirically establishing that AR/VR marketing and customer engagement acts as significant predictors of the consumers' intention to use online platforms. Based on the conceptual framework, this study attempted to assess the indirect effect of customer engagement on purchase intention which is proposed in hypotheses H4. The study result of the indirect effect hypothesis (H4) was supported and found significant. The result of the mediation test suggested that customer engagement mediates the relationship between AR/VR marketing and intention to use. The study confirms that most of the AR/VR marketing effects on consumers' intention to use are transmitted through customer engagement.

CONCLUSION

Online platforms and social media have emerged as an effective tool for marketing activities by marketers in the recent past. The increasing use of online marketing activities by marketers to influence the consumers' purchase intention or buying decisions has been under investigation by academic practitioners. In the same line of thought, the present study is an attempt to explore the role of AR/VR marketing activities and customer engagement on consumers' intention to use. The study successfully concluded the direct and indirect effects of the proposed constructs and the mechanisms by which AR/VR marketing can be made to positively influence the intention to use online platforms. The study also concluded the role and importance of customer engagement in the relationship of AR/VR marketing and its desired outcomes.

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