

EXTENDED REALITY (XR) IN HIGHER EDUCATION – AN APPROACH TO MILLENNIALS & CENTENNIALS

* **Dr. M. MUNIRAJU**, Professor, Dean & Chairman, Department of Commerce & Management, Bengaluru City University, Central College Campus, Ambedkar Veedhi, Bengaluru-560001.

** **KOMAL.S**, Research Scholar, Department of Commerce, Bengaluru City University, Central College Campus, Ambedkar Veedhi, Bengaluru-560001

ABSTRACT

Purpose: Mainly, this study aims to probe and to spot how far the demographic percussion on the study Extended Reality (XR) strategies adopted in some selected colleges of Bengaluru Urban. The study collected data on awareness regarding opportunities, preferences and barriers of XR. Extended Reality is a promising new technology. What was previously a passive process of observation is now an active process of immersion in both the real and virtual worlds. (Stephanie Hai – Wen Chuadh, 2019). By connecting the real and virtual worlds, XR, the next generation computing platform, has revolutionised how we work, study, connect, and even relax (Rauschnabel et al., 2017).

Methodology / Design: Variables were measured using tests such as Contingency co-efficient, Kendall's coefficients of concordance, Chi-square, and ANOVA analysis.

Findings: According to the analysis, there are favourable demographics supporting the study on XR in higher education. Opportunities like XR were determined to be beneficial to education because they facilitate knowledge acquisition, facilitate the simplification of complicated topics for students, and provide students a greater degree of action over their own education. Further, the study reveals about barriers like expensive content creation, student acceptance and software and content refinement.

Keywords: Technology, creation, barriers, higher education, Millennials and Centennials, digital, next generation.

I. INTRODUCTION:

Education is a critical factor in achieving long-term, sustainable social development and has the potential to close the socioeconomic gap that exists in our society. Recently, a significant number of theoretical and practical researches on the use of XR in the area of education for the purpose of sustainable development have come to light. Generation-Y (millennials) and Z (centennials) have diversified tech exposures as they utilise electronic gadgets for higher education, experimenting and games. "Ensuring inclusive and equitable quality of education and fostering lifetime opportunities for everyone" are the objectives outlined in the 2030 Agenda for Sustainable Development. The question before us is how an uneven educational resource, educational equity and the citizen's rights are addressed on social problems which are deep rooted (GUO, X, et al., 2021). The use of XR in the classroom has the potential to address some of the challenges hindering the field's progress toward a more sustainable future. Teachers motivate to experiment with and use new approaches, strategies, and tools in the classroom as an opportunity made possible by advances in modern science and technology continue to increase. Universities can be large generators of profit when compare to primary and secondary schools and hence may develop a targeted curriculum that adopts XR tech in specific markets like health, engineering and commerce to prepare the next generation of the labour market. To make users feel as if they have entered a whole other digital realm, XR gadgets use optical illusions (O'Donnell, 2018). XR also changes the way businesses service consumers, create new products, and oversee their supply chains (Chmielewski, 2017).

II. THE STATEMENT OF PROBLEM

Since the traditional analogue education model was somewhat costly, it seems that XR implementation helps lower total institutional expenses. The cost of XR learning experiences has been reduced, opening them up to more students. However, it takes effort and expertise to integrate into the current procedure. Every day, XR technologies open up exciting new possibilities for classrooms and their pupils. Content that has to be taught may be provided independently in classrooms in a low-cost and safe setting using different virtual environments (VE) and imagining systems. Academic performance and student motivation were shown to increase in the correlation with the use of XR technology. XR technology may help level the playing field between in-person and online courses, allowing for additional options for collaboration and presence now that more courses are being offered in an online format. Because of its status as a hub for higher learning, Bengaluru has a responsibility to ensure that its aspirant millennial and

centennial populations have access to the high-quality education they deserve via the use of XR technology.

III. REVIEW OF LITERATURE

A study titled "Overall Research Trends in the Area of Education" by Guo, X et al., 2021 looked at the collaboration between authors, institutions, and countries as well as significant journals and popular subjects in the application of XR to the field of education. The research used biometric analysis to find publications that evaluated the impact that XR has had on educational settings. According to the findings of the study, the use of XR in educational settings is a developing movement, and researchers predict that there will be an increase in the number of XR educational goods.

According to Valentin Kuleto et al. (2021), schools and enterprises in the education technology sector may gain an edge by trying out novel methods of instruction. In order to keep up with the rising need for individualised and flexible education, these institutions will have to adopt XR practises. The writers also noted that XR may provide fresh viewpoints. Colleges and universities have realised the need of modifying XR material to meet the needs of today's students, who share many of the traits of generations Y and Z and with whom they want to share their beliefs.

Education, training, and skill improvement across disciplines may all benefit from the Internet of Everything (IoE), according to Senthilkumar Jagatheesaperumal's (2022) meta-verse-level examination of XR solutions and accompanying difficulties. Important characteristics of XR and IoE technologies that are integral to training and skill improvement in the meta verse were also addressed. The authors' work contributes to a better grasp of the cutting-edge capabilities of XR and 10E devices and how they fit the needs of the meta verse in educational settings.

IV. OBJECTIVES OF THE STUDY

1. To examine respondents' socioeconomic status..
2. To analyze the prospects presented by XR in higher education.
3. To investigate the obstacles to XR deployment.

V. HYPOTHESIS

1. Socioeconomic factors do not have an impact on the study.
2. In higher education, the opportunities for XR do not differ significantly.
3. There are no implementation hurdles for XR.

VI. RESEARCH QUESTION

1. Why do demographics not support the research?
2. What are the opportunities of XR in higher education?
3. What obstacles face the adoption of XR?

VII. RESEARCH METHODOLOGY

Research Methodology: Research methodology is a systematic and scientific method to be followed while doing any research programme. It is actually a voyage of discovery (Kothari, C.R. 2013). It is a strategy for answering the structured questionnaire using empirical data (Shana, 2021).

Questionnaire design: It is a set of logic questions included for the purpose of data obtained from respondents (Saul McLeod, 2018). The information was gathered in natural surroundings at the educational centre when students were entering the college or after they had left the institution.

Sources of data: This inquiry utilises both primary and secondary information sources. A structured questionnaire was used to gather the majority of the data. The Internet and electronic journals are employed as secondary sources.

Universe of study and sample: The city of Bengaluru Urban is the sole location that this research will focus on, and a total of one hundred samples will be analysed. For the goal of collecting data, interviews were conducted with a variety of students attending government and private universities in Bengaluru.

The Method of analysis: Kendall's co-efficient of concordance, contingency co-efficient, and ANOVA are done since they are straightforward and adequate for the investigation.

Limitations of the study

1. The research is limited to Bengaluru urban exclusively.
2. Difficult to find out the colleges using only XR technologies.
3. The sample is small and any further interpretation requires the further in-depth study.

VIII. DATA INTERPRETATION AND ANALYSIS: DEMOGRAPHIC PROFILE OF RESPONDENTS – SECTION – A

The Gender, age, education level, XR familiarity, and institution type were among the socioeconomic factors of respondents analysed for its effect on the digitalization process.

Research question No. 1: How far the socio economic characteristics support the study on XR strategies and higher education?

Hypothesis No. 1: H₀: Socioeconomic factors do not have an impact on the study.

H₁: Socioeconomic factors do have an impact on the study

Table-1 depicts facts on the socioeconomic factors of data. There are 72 male respondents and 28 female respondents, and 31 are studying in government institutions and 69 studying in private intuitions. Moreover, 48 are pursuing a bachelor's degree, 25 are pursuing a master's degree, 19 are pursuing an associate's degree, and 8 are pursuing a doctorate in various fields; 88 are aware of XR; and the age parameter reveals that 35 belong to the 25-30 year age group, 20 each to the 30-35 and 15-20 year age groups, 18 to the 20-25 year age group, and 35 to the > 35 year age group. All demographics have a substantial influence on digitization, and there is a strong correlation between the features and the digitalisation process.

DATA INTERPRETATION AND ANALYSIS: APPROACH TO Y&Z MILLENNIALS – SECTION - B

Research Question No. 2: What are opportunities of XR in higher education?

Hypothesis No. 2: H₀: In higher education, the opportunities for XR do not differ significantly.

H₁ : In higher education, the opportunities for XR do differ significantly.

Table – 2 gives information on possible XR uses in the sphere of higher education. Out of 200 responders, 64 expressed a strong agreement, followed by 27 others who agreed and 9 others who somewhat agreed. Out of 64 people who provided a response of "strongly agree," 22 mentioned the advantage that XR can promote learning, 7 said that the In order to encourage students to take more responsibility for their own education, XR systems allow them to interact with their courses in novel ways. And 6 out of 10 participants cited XR's usefulness in the classroom. 7 out of 27 people who responded said that they agreed because XR makes it possible for more realistic, hands-on practise with authentic materials; 5 said that they agreed because XR helps in the learning process; and 4 said that they agreed because the XR system gives students more control over their own education. Out of 9 people who said they somewhat agree with the statement, all 2 respondents supported that XR supports learning, allows students to learn complex topics, and connectivity between students and faculty experience, among other things. In this instance, we may conclude that there is a strong association between the two provided

variables. since "W" rejects H0 but accepts H1.

Research question No. 3: What obstacles face the adoption of XR?

Hypothesis No. 3: H₀: There exists no implementation hurdles for XR.

H₁: There exists implementation hurdles for XR.

Table – 4 pertains to XR as well as obstacles. The responses showed that 63 people had a strong agreement, 28 people had an agreement, and 9 people were indifferent. 63 people gave their enthusiastic approval, with 16 citing student interest, 15 citing the high cost of content generation, and 10 offering their thoughts on how to improve both software and content. Out of 28 who said agree 8 expressed about student acceptance and 6 each pointed at expensive content and software and content refinement. Out of 9 who expressed somewhat agree, 3 each reported about software and content refinement and student acceptance. Due to the fact that ANOVA does not support H0 but does support H1, one may draw the conclusion that there is substantial variance in the barriers.

IX. SUMMARY, DISCUSSION AND FINDING:

The primary goal of this work is to assess the extent to which demographic factors influence research into the XR process at various educational institutions. Further, the study also found about opportunities and barriers. Survey technique is performed and the student respondents were interviewed in the selected universities and their affiliated colleges. The respondents belong to Urban Bengaluru. Using appropriate quantitative approaches like chi-square, Kendal's coefficient of concordance, and ANOVA methodologies, we present, analyse, and discuss the study's findings. The findings of the research supported the demographics which are impacting on the study. The opportunities preferred by the students in the order of merit includes XR supports opportunities, helps pupils grasp difficult concepts with ease and gives them more agency for their own education. Further, the study also found barriers like student acceptance, expensive content and software and hardware refinement.

X. CONCLUSION:

XR gadgets create an illusion that users are in a separate digital environment from their physical surroundings. This technology has received praise for its efficacy in the creation of virtual tours at retail locations and tourist hotspots, which may help people with brain injuries recover from their experiences. XR technologies have been increasingly applied in education. The success of these

technologies would depend upon willing university campuses to fight for XR research and development. Teachers may require previous training before they install these strategies in the classrooms. The study found the presence of significant and high degree characteristics of respondents impacting the study on XR impacting higher education. Further, the study found opportunities like XR supports learning enables pupils to acquire knowledge of more difficult topics in an approachable manner and provides learners with more agencies over the accomplishment of their educational goals and finally the study found barriers like student acceptance, expensive content of software and content refinement.

REFERENCES

1. Chimielewski, D. C. (2017). **Applies Tim Cook Says augmented reality will change everything.** (Online) <https://deadline.co/2017/11/apple> tim cook augmented reality fourth quarter 2017 earnings – 1202200710/accession (20th April 2022)
2. Guo, X., Guo, Y., Liu, Y. (2021). The development of Extended Reality in Education: Inspiration from the Research Literature. **Sustainability**, 13, 1376, <https://doi.org/10.3390/Su132413776>.
3. Kothari., C.R. (2013). Research Methodology, New Age International (P) Ltd., Publishers, New Delhi.
4. O'Donnel, D. (2018). Driving Immersive in virtual and augmented reality (online) <https://blog-western-digital.com/driving-immersive-expensive-virtual-augmented-reality/> accessed on 21st April 2022).
5. Rauschnabel, P.A., Rossmann, A., and Tom Dieck, M.C. (2017). An adoption framework for mobile augmented reality games: the case of pokemon Go. **Competence in Human behaviour**, Vo. 76 PP. 276-286.
6. Sethil Kumar Jagatheesaperumal., Kashif Ahmad., Ala Al-Fuqaha., & Junaid Qadir (2022). Advancing Education through XR & Internet of Everything Enabled Metaverses: Applications, challenges and open issues. **Elsevier ar xiv** : 2207.01512x1 (cs.cy). 27th June 2022.
7. Shona McCombes. (2021). How to create a research design. <http://www.scribber.com/research>.
8. Stephanie Hui-Wen Chuah. (2019). Wearable XR-technology, literature review, conceptual framework and future research directions. **International Journal of Technology Marketing**, 13(3/4), 205-259.

9. Valentin Kuleto., Milena Ilic, P., Monica Stanescu., Marko Rankovic, Navenka Popovic Sevic, Dan Paun., and Silvia Teodoresch. (2021). XR in HE, a responsible innovation approach for generation Y & Z. *Sustainability* 2021, 13, 1184 <https://doi.org/103390 Su 13211814>.

TABLES AND CALCULATIONS

Table – 1: The Demographics profile of respondents

Demographic parameters	χ^2	TV@0.05	df	Result of χ^2	“c”	Result of ‘C’
Gender(M/F)	19.36	3.841	1	significant	.40	High Degree
Age	19.90	9.488	4	significant	.40	High Degree
Qualification	34.16	7.815	3	significant	.50	High Degree
Awareness of XR	57.76	3.841	1	significant	.60	High Degree
The type of institution	23.04	3.841	1	significant	.43	High Degree

Source: Field Survey

Please take note that $\chi^2 = \text{chi-square } 'c' = (\chi^2 / \chi^2 + N)$

Where "c" is the contingency factor

N stands for 'N' observations.

When the value 'c' is equal to or close to 1, it indicates a strong correlation between characteristics. The probability coefficient will always be smaller than 1.

Table – 2: Opportunities of XR in the Higher Education

DIFFERENT OPPORTUNITIES	SA	A	SWA	RT	RT ²
XR supports learning	22	5	2	29	841
XR Facilitates teaching process	6	2	-	8	64
The XR system allows students to have more control over their learning practices.	7	4	-	11	121
XR engages and encourages pupils.	5	3	1	9	81
XR simplifies the learning of complicated topic	9	7	2	18	324
XR enables students to immediately experience studying subject in a realistic setting.	3	1	-	4	16
XR promotes the engagement and connectedness experienced by	4	2	2	8	64

students and educators.					
XR tools foster the development of pupils' creative reasoning.	5	1	-	6	12
XR systems allow effective learning, which is promoted through experiential learning	3	2	2	7	49
Total	64	27	9	100	572

Source : Field Survey

Note: SWA - Somewhat Agree, A - Agree, SA - Strongly Agree Row Total

$$\begin{aligned}
 SSR &= \sum RT^2 - (\sum RT)^2 / N \\
 &= 1572 - (100)^2 / 9 \\
 &= 1572 - 1111.11 = \mathbf{460.89}
 \end{aligned}$$

$$\begin{aligned}
 W &= 12 \times SSR / K^2 N (N^2 - 1) \\
 &= 12 \times 460.89 / 9 \times 9 (89-1) \\
 &= 5530.68 / 6480 = \mathbf{0.85}
 \end{aligned}$$

Using the chi-square statistic, evaluate the significance of W.

$$\begin{aligned}
 x^2 &= k (n-1) w \\
 &= 3 (9-1) 0.85 \\
 &= 3 \times 8 \times 0.89 = \mathbf{20.40}
 \end{aligned}$$

Decision: TV = 15.507 at a 0.5 level of significance with 8 degrees of freedom. As the estimated value is 20.40 more than the crucial table value, 'w' rejects H0 in favour of H1. As a result, we might infer that there is a strong connection between success and education level.

Table – 3: XR and the Barriers

BARRIER S	SA	A	SWA	T
Funding	6	3	1	10
Expensive content creation for XR technology	15	6	1	22
Staff compliance	5	2	-	07
Software and content refinement	10	6	3	19
Constant need to purchase new equipment, since upgraded versions are always introduced.	5	1	-	06
Student acceptance	16	8	3	27

XR software and hardware geared mostly for the consumer market	6	2	1	09
Total	63	28	9	100

Source: Field Survey

Note: SWA stands for "Somewhat Agree," SA for "Strongly Agree," and T for "Total."

Hypothesis

H ₀	There are no major differences among these data.	Reject
H ₁	There exist major differences among these data.	Accept

ANOVA Table

Source of variation	SS	df	MS	f-ratio	5% limit (From F Table)
Between sample	411.7955	(3-1) = 2	411.7955/2 = 205.90	205.90 / 10.41 = 19.78	
Within the sample	187.4287	(21-3) = 18	187.4287/18 = 10.41		(2, 18) 3.55
Total	599.2242	(21-1)=20			

Source: Survey data

ANOVA Analysis: Based on the results of the analysis of variance, it can be determined that there is considerable variation in the data since the computed value is 19.78, which is larger than TV = 3.55 at the 5% level of significance with $df = v_1 = 2 \ v_2 = 18$.