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Let's Start!

Metaverse Schooling: Prospects for Future Generations of Learners

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Abstract

The concept of metaverse schooling became famous during the current decade. The objective of this research was to explore the prospects of metaverse schooling, and analyze the viability and future impact of metaverse-based learning; and the questions were posed what are the key advantages of metaverse schooling for future generations; how can the metaverse enhance student engagement, and collaboration; what are the challenges associated with implementing metaverse-based education at scale? A quantitative descriptive approach was utilized; students and teachers from educational institutions offering online or hybrid learning experiences across Punjab, Pakistan were targeted; 320 was the sample, and a structured questionnaire was used to collect data. NVIVO was used for qualitative data analysis, however, for the quantitative data, SPSS version 26 was used for the descriptive statistics analysis to identify trends and correlations associated with the implementation and future effect of metaverse schooling. The results indicated that metaverse schooling has vast potential to enhance interactive and inclusive learning if challenges like the digital divide, infrastructure, and teacher capability are addressed. Similarly, metaverse platforms significantly develop student engagement, collaboration, and creativity, however, successful implementation depends on appropriate integration. It further indicated that the metaverse portrays a better future for education, subject to careful consideration of technological, economic, and cultural factors. The study recommends that teachers, institutes, and legislators work together to develop plans for teachers' training, refining infrastructure, and providing equal access to metaverse-based learning platforms.

Keywords: Metaverse, Metaverse schooling, Prospects

INTRODUCTION

Metaverse has been defined by various scholars. Ball (2024) presented that the concept of the metaverse has emerged from Science fiction. He further described that the metaverse is a shared virtual space, created by the convergence of virtually enhanced physical reality. Similarly, Dionisio et al. (2021) highlighted that the metaverse is a 3D virtual world. A wide range of immersive activities, from gaming to social interaction, education, commerce, and entertainment came from the metaverse that allows persistent and real-time interaction among users via avatars. Metaverse is a virtual space that provides new learning models, work, socialization, and business; an interconnected virtual environment facilitates users to interact with others and immerse themselves in digitally created spaces (Cummings & Dastin, 2022). The metaverse is an interoperable ecosystem of virtual worlds that can be simultaneously accessed by multiple users (Tingelhoff et al., 2024). Similarly, Affairs and Meta (2023) believed that metaverse technologies possess the to transform school lessons, align teachers and students together remotely in shared spaces, improve professional training, and generate innovative prospects for lifelong learning. They further believe that VR can certainly expand a variety of learning outcomes like understanding, memory, retention, student engagement, self-consciousness span, and motivation. Metaverse can cope with geographic inequalities and provide students with chances to learn from people and institutions they can't access locally. (Meta, n.d.) indicated that they are reimaging the world of education with mixed reality. They further believe that by using cutting-edge technology and discovering new ways to teach, there are boundless possibilities for learning.

Metaverse schooling is based on immersive, virtual learning environments employing technologies like Virtual Reality (VR) and Augmented Reality (AR), redesigning routine teaching. It possesses the potential to have better engagement, availability, and personalized learning practices. Metaverse schooling refers to the virtual platforms that provide learners and teachers with immersive 3D environments where they can discover, interact, and acquire knowledge in ways that traditional classrooms cannot offer. Students of history can virtually visit ancient civilizations, while biology students can explore the human body in detail (Lee & Hwang, 2022); students can benefit from personalized learning, and can receive a customized learning experience, which may improve their comprehension and retention (Zhang et al., 2023); cross-cultural exchanges are possible beyond boundaries and foster global consciousness and collaborative skills (Wang et al., 2023); can provide gamification of learning to motivate and engage students by improving student participation and outcomes (Deterding et al., 2011); provides decentralized education since blockchain technology can be used to create decentralized educational platforms and can revolutionize the way academic outcomes are recorded and tested (Chen et al., 2022).

The concept of metaverse and metaverse schooling is under research. The existing literature about metaverse schooling encompasses the hi-tech potential, however, research on

effective pedagogical models, teacher training (pre-service, in-service, post-service), and equity challenges in diverse educational settings is still very limited. Similarly, literature lacks the empirical studies on the long-term impact of metaverse schooling on students' learning, learning outcomes, engagement, and well-being which indicates a research gap.

This study is significant because it aims to explore the prospects of metaverse schooling and analyze the viability and future impact of metaverse-based learning. It provides perceptions of teachers and students of the institutions where practices of AI, VR, and AR are in vogue. Furthermore, it discourses the need for research on effective pedagogy, infrastructure requirements, and equity in metaverse environments, contributing workable recommendations in implementing this new educational paradigm. In the end, the findings of this research will help to shape the upcoming education in a digital and immersive world.

The objective of this research was to explore the prospects of metaverse schooling and analyze the viability and future impact of metaverse-based learning. The following three questions were developed to achieve the objective of this research:

a.   What are the key advantages of metaverse schooling for future generations?
b.   How can the metaverse enhance student engagement and collaboration?
c.   What are the challenges associated with implementing metaverse-based education at scale?

This study was conducted to explore in-depth knowledge, benefits, and challenges associated with integrating diverse technologies in educational settings. The focus was on understanding how metaverse schooling can improve engagement, personalized learning, infrastructure requirements, and teacher training needs. Further, the recommendations will also be extracted.

This study was limited by several factors like disadvantaged socio-economic backgrounds, unavailability of theoretical frameworks, trained teaching force, the lack of extensive and long-term research on the effectiveness of metaverse schooling in real-world educational settings, and lack of high technological infrastructure; the findings may be based on preliminary. Further, due to the wider span of the research depth, the study was delimited to only one province (Punjab, Pakistan) with its urban institutes and the students and teachers from educational institutions offering online or hybrid learning experiences from every division of Punjab, Pakistan.

METHODOLOGY

The overall Research Design was a mixed method (QUAN-qual). Punjab, Pakistan was selected as the target population which possesses ten (10) administrative divisions namely, Rawalpindi Division, Gujranwala Division, Lahore Division, Faisalabad Division, Sargodha Division, Multan Division, Bahawalpur Division, Dera Ghazi Khan Division, Sahiwal Division, and Muzaffargarh Division. Four schools from each administrative division of Punjab, Pakistan, were selected as a sample that offers online or hybrid learning.

Similarly, three school teachers and ten students from each school were contacted to provide data. Therefore, one hundred twenty (120) teachers and two hundred (200) students provided their perception of the metaverse schools in terms of questionnaires.
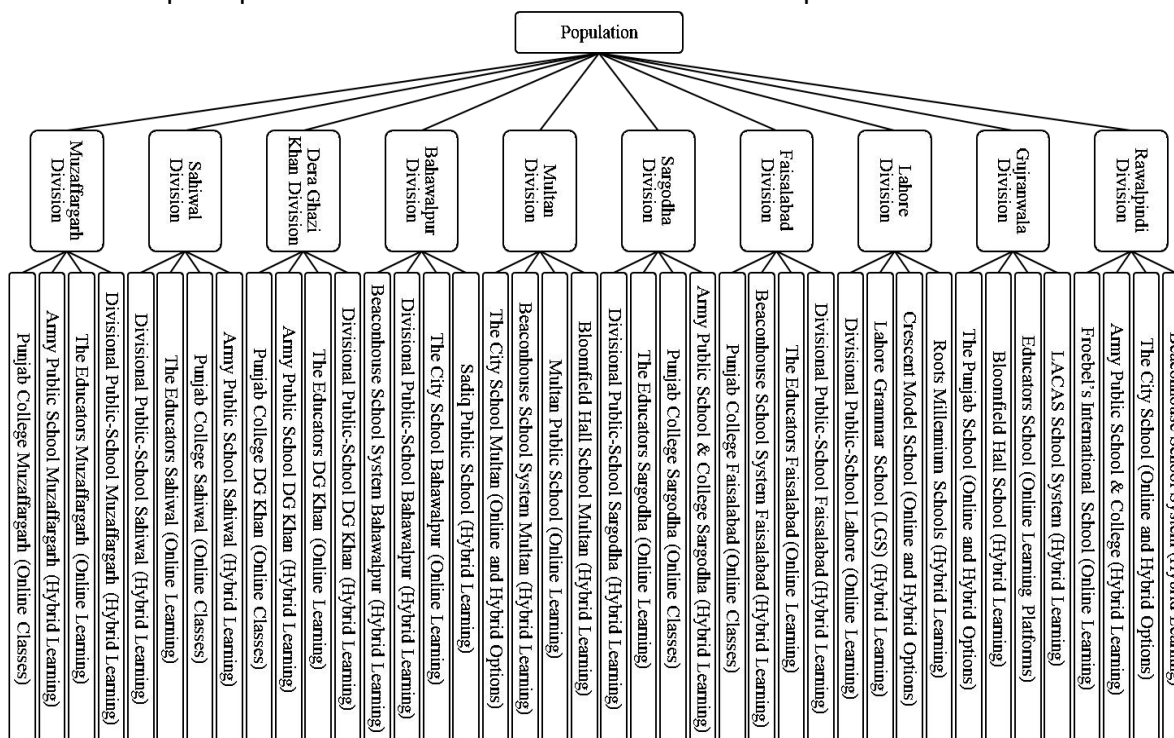
DATA COLLECTION

Data were collected by employing a Metaverse Schooling Questionnaire (MSQ) meant to provide insight into its prospects for future generations of learners. This questionnaire was implemented through a survey of both teachers and students to get perceptions related to metaverse learning. The questions aimed to gather both quantitative and qualitative data so that a comprehensive overview of the impact of metaverse schooling may be gathered and presented. The Metaverse Schooling Questionnaire (MSQ) consists of six -sections which are demographic information, awareness and access to metaverse schooling, perceptions of metaverse schooling, challenges in implementing metaverse schooling, future prospects of metaverse schooling, and open-ended feedback.

	Section 1	Demographic Information
	Section 2	Awareness and Access to Metaverse Schooling
Metaverse Schooling Questionnaire (MSQ)	Section 3	Perceptions of Metaverse Schooling
	Section 4	Challenges in Implementing Metaverse Schooling
	Section 5	Future Prospects of Metaverse Schooling
	Section 6	Open-Ended Feedback
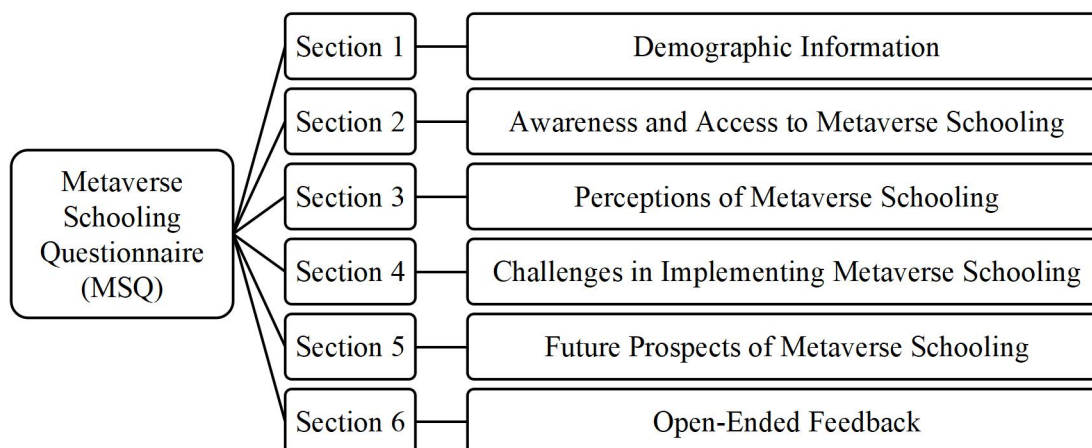
DATA ANALYSIS/RESULTS

Based on the responses received after implementing the questionnaire, the following descriptive statistical analysis was performed to identify trends and correlations related to the implementation and future effects of metaverse schooling. The data were summarized in a descriptive statistic and the general trends among the 200 learners and 120 teachers.

QUESTION 1

FAMILIARITY WITH METAVERSE SCHOOLING

80% of students and 86% of teachers were very familiar with metaverse schooling but 19% of students, and 13% of teachers were somewhat familiar however, 1% of students, and 1% of teachers were not familiar at all with metaverse schooling.
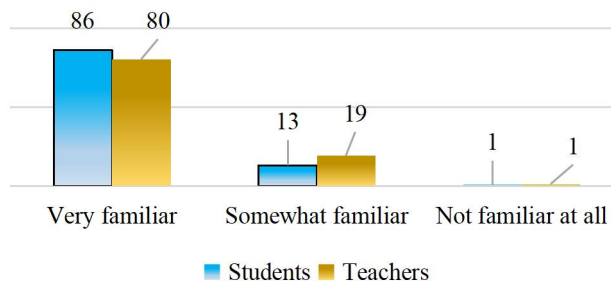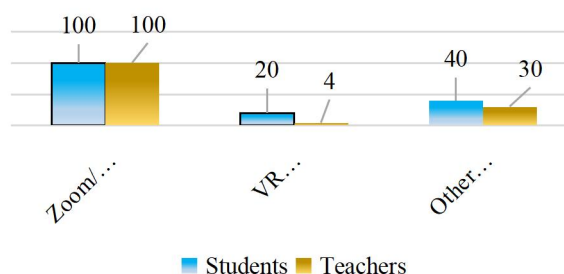

QUESTION 2

PARTICIPATION IN METAVERSE-BASED CLASSES

Almost every participant had participated in any metaverse-based learning like Zoom/Google Meetings, Virtual Reality (VR) software, or any other platforms like Skype, etc.

QUESTION 3
### USAGE OF TYPE OF PLATFORM/ TECHNOLOGY FOR THE METAVERSE LEARNING EXPERIENCE

100% of students and 100% of teachers had used Zoom/Google Meet for the metaverse learning experience, but 20% of students, and 4% of teachers had used Virtual Reality (VR) software, however, 40% of students, 30% of teachers had used other platforms like Skype for the metaverse learning experience.

QUESTION 4

ACCESS TO TECHNOLOGY FOR METAVERSE SCHOOLING

100% of students and 100% of teachers possess computer and internet technology for metaverse schooling and 20% of students and

4% of teachers possess VR headsets for metaverse schooling.
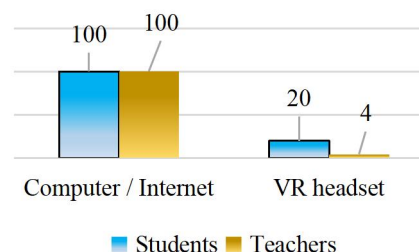
QUESTION 5

### DURATION OF USING TECHNOLOGY FOR LEARNING
PURPOSES

80% of students and 70% of teachers use technology daily, however, 10% of students and 6% of teachers use it several times a week, similarly, 6% of students and 16% of teachers use it occasionally, but 4% of students and 8% teachers use it rarely.
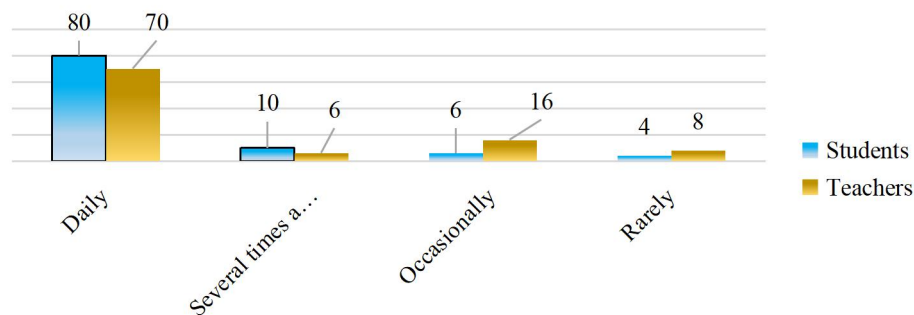
QUESTION 6

PERCEPTION OF ENGAGEMENT AND MOTIVATION

The mode so obtained in the most common response was "agree". Whereas, teachers and the students showed almost similar perceptions, with the teachers (Mean= 4.7, SD= 0.8) and students (Mean= 4.6, SD= 0.8) indicating metaverse schooling possesses a high potential to improve student engagement and motivation.
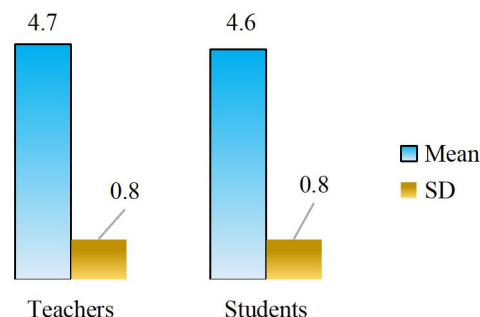
QUESTION 7

EFFECTIVENESS OF METAVERSE SCHOOLING

The mode so obtained (in the most common response) was "Very Effective". Whereas, teachers and the students showed almost similar perceptions about the effectiveness of metaverse schooling, with the teachers (Mean= 4.6, SD= 0.8) and students (Mean= 4.5, SD= 0.9) indicating that metaverse schooling is very effective in enhancing learning outcomes as compared to traditional methods.
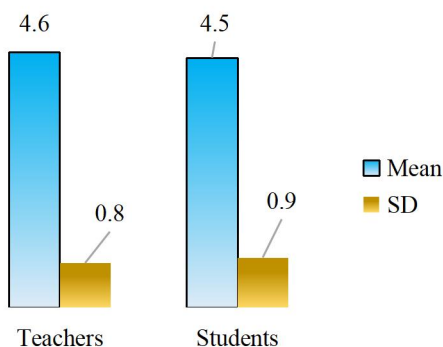
QUESTION 8

### RECOMMENDATION OF METAVERSE-BASED LEARNING TO OTHERS

The mode about the recommendation of metaverse-based learning to others so obtained was "Likely". The teachers and the students showed almost similar perceptions, with the teachers (Mean= 4.8, SD= 0.8) and students (Mean= 4.7, SD= 0.8) recommending that metaverse schooling is better as compared to traditional methods.
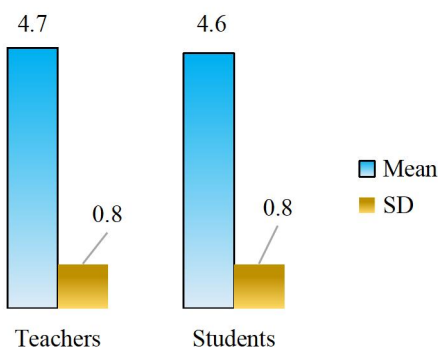
QUESTION 9

**METAVERSE SCHOOLING PROVIDES A MORE PERSONALIZED LEARNING EXPERIENCE**

78% of students and 91% of teachers think that metaverse schooling can provide a more personalized learning experience. However, 11% of students and 7% of teachers were unsure about it. Similarly, 1% of students and 2% of teachers perceived that metaverse schooling cannot provide a more personalized learning experience.
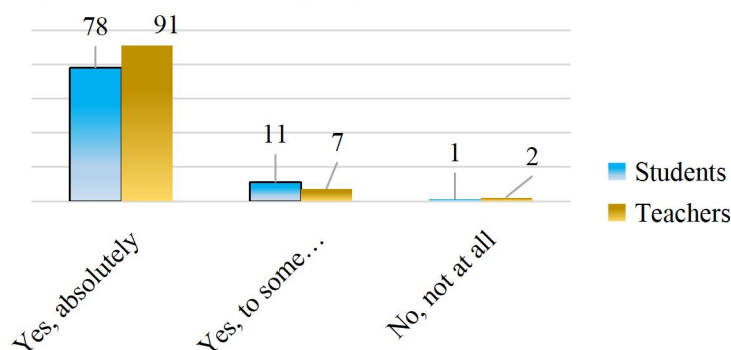
QUESTION 10

**THE MAIN ADVANTAGES OF METAVERSE SCHOOLING**

84% of students and 86% of teachers think that metaverse schooling can provide increased engagement and interaction. However, 6% of students and 7% of teachers indicated it as providing flexibility in learning pace and time. 5% of students and 3% of teachers perceived that metaverse schooling can provide more immersive learning experiences. Similarly, 3% of students and 2% of teachers perceived that metaverse schooling can provide better access to resources and content. Moreover, 2% of students and 2% of teachers perceived that metaverse schooling can provide greater collaboration among students.
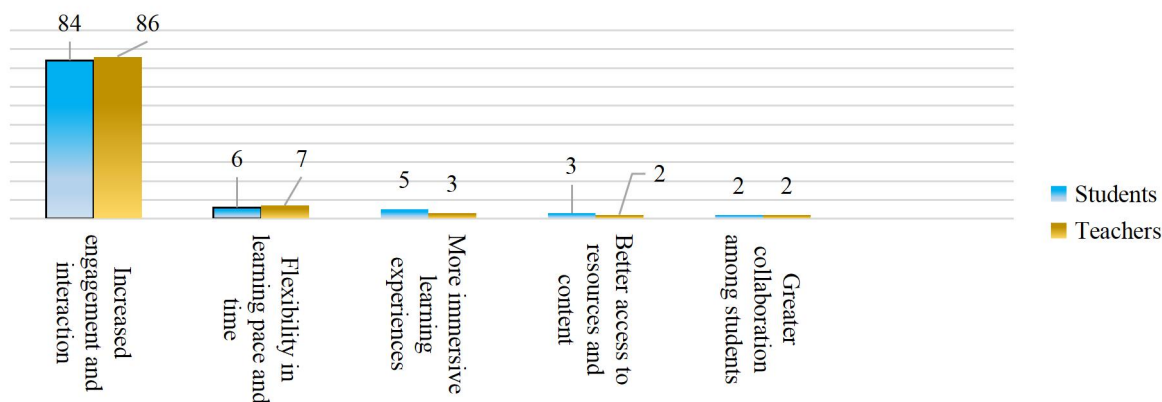
QUESTION 11

**CHALLENGES IN PARTICIPATING OR TEACHING IN METAVERSE-BASED SCHOOLING**

88% of students and 87% of teachers think that metaverse schooling can face the challenge of lack of access to technology (e.g., VR headsets, computers). Similarly, 5% of students and 6% of teachers indicated poor internet connectivity. However, 2% of students and 3% of teachers perceived that metaverse schooling can suffer the challenge of a lack of training for teachers. 2% of students and 2% of teachers indicated the challenge of a lack of digital literacy or tech-savviness. 2% of students and 1% of teachers indicated the challenge of difficulty in adapting to the new learning environment. 1% of students and 1% of teachers perceived it as security and privacy concerns.
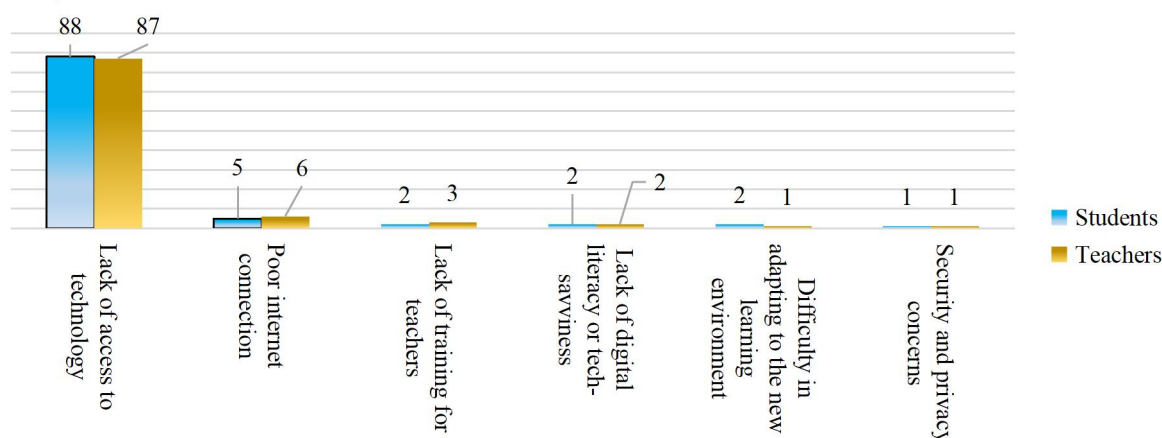
QUESTION 12

**READINESS OF TRADITIONAL TEACHING TO INTEGRATE METAVERSE SCHOOLING EFFECTIVELY**

97% of students and 98% of teachers think that the traditional educational system is ready to integrate metaverse schooling effectively. However, 1% of students and 1% of teachers were unsure about it. Similarly, 2% of students and 1% of teachers perceived that the traditional educational system is ready to integrate metaverse schooling effectively.
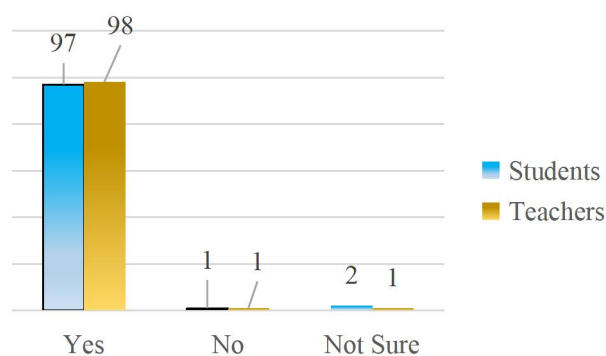
QUESTION 13

CURRENT LEVEL OF TEACHER TRAINING IN USING METAVERSE TECHNOLOGIES

35% of students and 33% of teachers feel that the current level of teacher training in using metaverse technologies is very well trained. However, 48% of students and 47% of teachers feel that the current level of teacher training in using metaverse technologies is moderately trained. Similarly, 11% of students and 13% of teachers feel that the current level of teacher training in using metaverse technologies is not trained at all. Moreover, 6% of students and 7% of teachers were unsure.
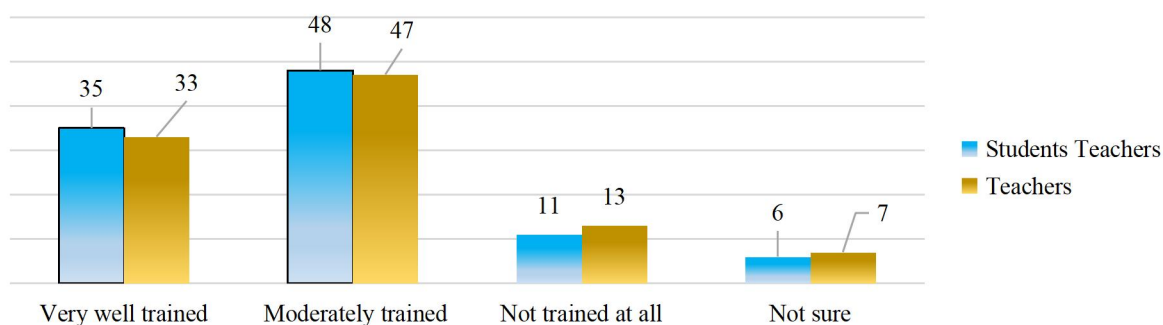
QUESTION 14

METAVERSE SCHOOLING IN THE NEXT 5-10 YEARS

43% of students and 47% of teachers think that metaverse schooling will become more common in the next 5-10 years, but 51% of students and 48% of teachers denied this perception. However, 4% of students and 3% of teachers replied "maybe". Similarly, 2% of students and 2% of teachers were not sure about it.
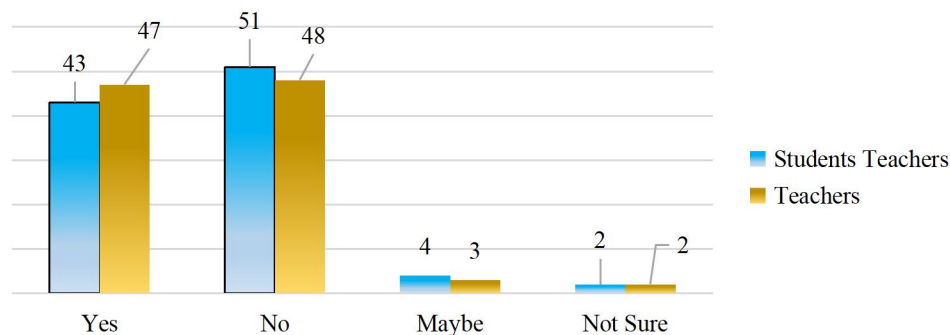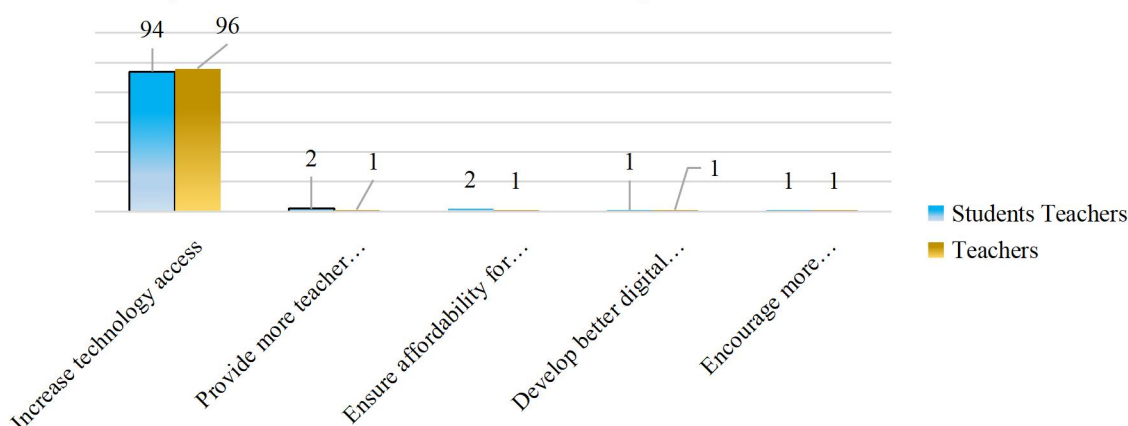

QUESTION 15

SUCCESSFUL IMPLEMENTATION OF METAVERSE SCHOOLING

94% of students and 96% of teachers suggested increasing technology access (computers, internet, VR equipment) for the successful implementation of metaverse schooling. However, 2% of students and 2% of teachers suggested providing more teacher training on digital platforms. Similarly, 2% of students and 1% of teachers indicated ensuring affordability for

students and institutions. 1% of students and 1% of teachers pointed out to develop better digital literacy programs. Moreover, 1% of students and 1% of teachers perceived that encouraging more collaboration between educational institutions and tech providers can help the successful implementation of metaverse schooling.

QUESTION 16
THE IDEAL OUTCOME OF INTEGRATING METAVERSE SCHOOLING

35% of students and 38% of the teachers opinion that enhanced learning experiences would be the ideal outcome of integrating metaverse schooling in future education systems. However, 24% of students and 22% of teachers opinionized more inclusive and accessible education. 28% of students and 26% of teachers went with reduced disparities in education, and 13% of students and 14% of teachers' opinion better preparation for future workforce would be the ideal outcome of integrating metaverse schooling in future education systems.
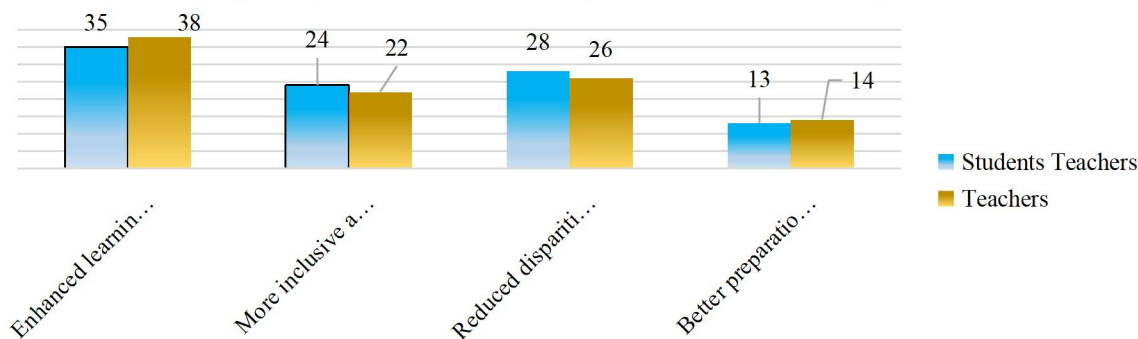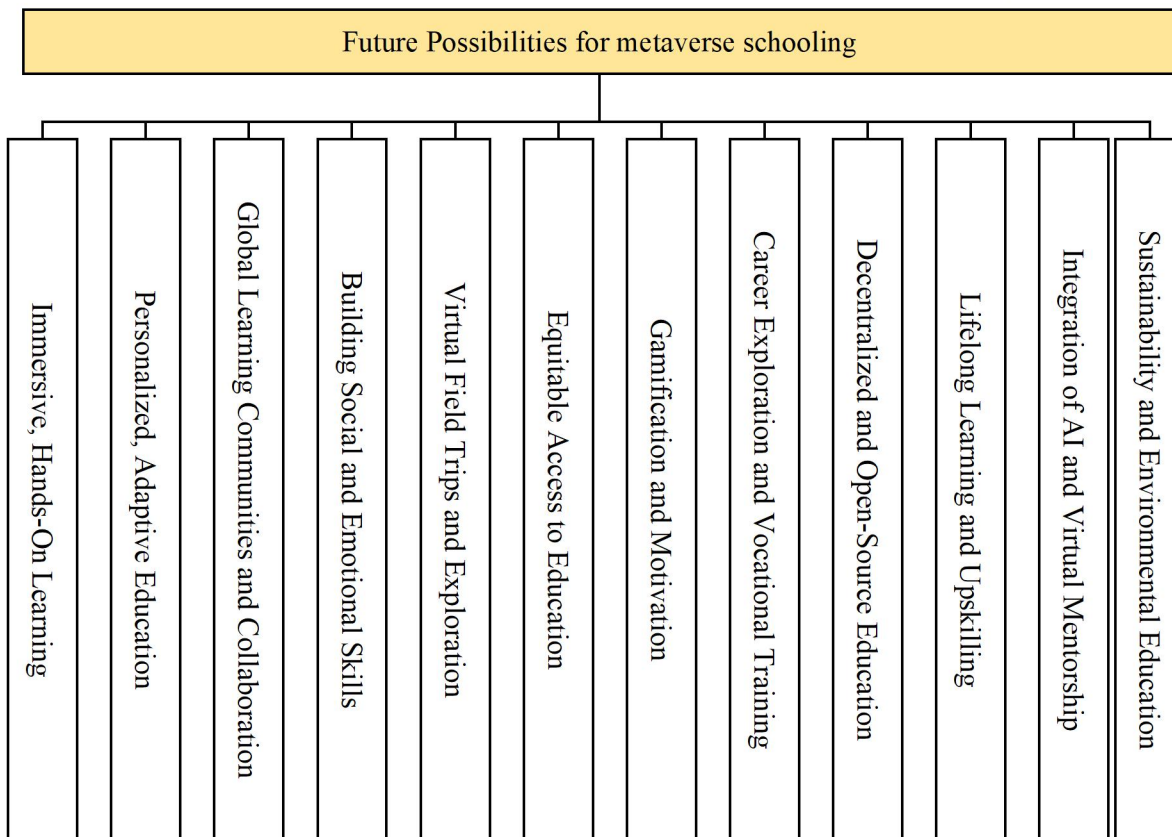

QUESTION 17
EXCITING POSSIBILITIES FOR METAVERSE SCHOOLING IN THE FUTURE

Students and teachers were asked to provide their opinions on what they think about the most exciting possibilities for metaverse schooling in the future. They provided diversified opinions on it. The below-mentioned themes were extracted from the data obtained about providing their

knowledge about the most exciting possibilities for metaverse schooling in the future.


Future Possibilities for metaverse schooling

- Immersive, Hands-On Learning
- Personalized, Adaptive Education
- Global Learning Communities and Collaboration
- Building Social and Emotional Skills
- Virtual Field Trips and Exploration
- Equitable Access to Education
- Gamification and Motivation
- Career Exploration and Vocational Training
- Decentralized and Open-Source Education
- Lifelong Learning and Upskilling
- Integration of AI and Virtual Mentorship
- Sustainability and Environmental Education

QUESTION 18

IMPROVEMENTS/SUGGESTIONS FOR A SUCCESSFUL TRANSITION TO METAVERSE

Students and teachers were asked to provide their opinions on what improvements or additional support they suggested for the successful transition to metaverse schooling. They provided diversified opinions on it. The below-mentioned ten (10) themes were explored regarding improvements or additional support for a successful transition to metaverse schooling are given below.

a.   Infrastructure and Accessibility
b.   Teacher Training and Professional Development
c.   Curriculum Adaptation and Design
d.   Digital Citizenship and Ethics
e.   Social and Emotional Learning (SEL)
f.   Parental Involvement and Communication
g.   Psychological and Social Adjustment
h.   Collaboration with Tech Companies and Industry Experts
i.   Cost-Effective Solutions
j.   Evaluation and Feedback Mechanisms

The below-mentioned figure describes the sub-divisions of the themes that were explored regarding improvements or additional support for a successful transition to metaverse schooling.
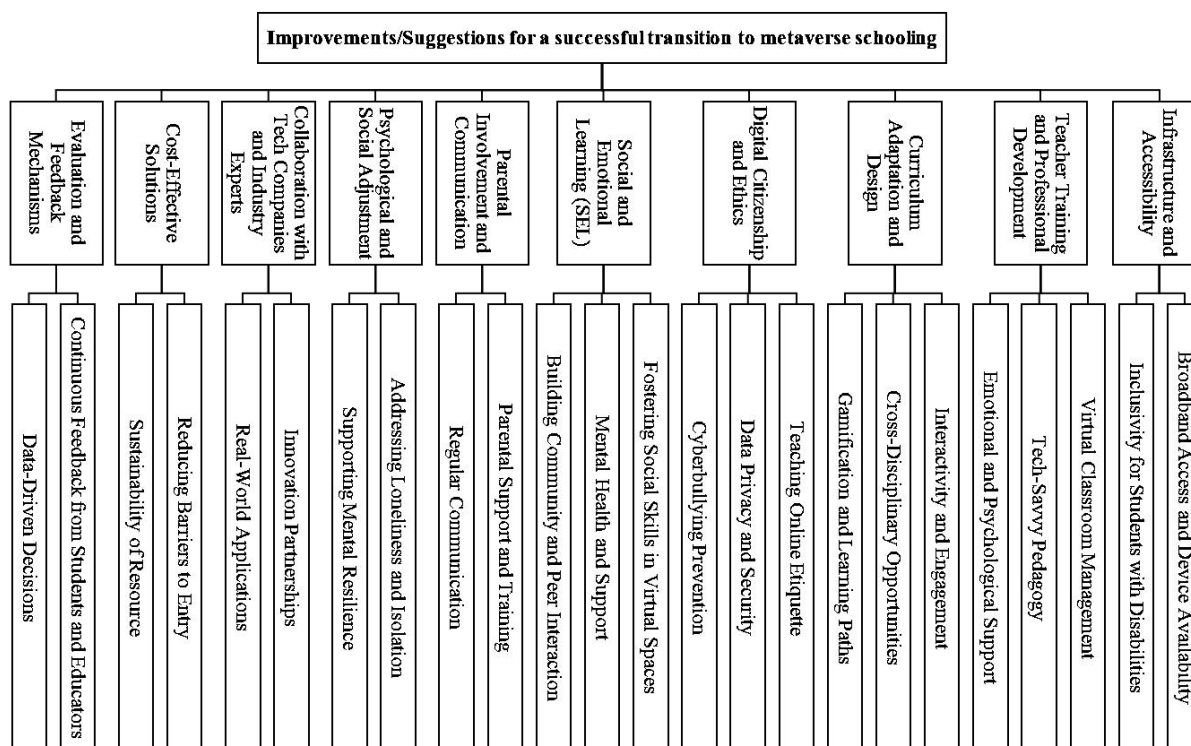
SUGGESTIONS/ RECOMMENDATIONS

Based on the findings of this study, the below-mentioned suggestions/ recommendations are made to support the successful transition to Metaverse schooling for an inclusive, effective, and equitable educational model for the future.

a. Comprehensive teachers' training programs may be started to make them well-versed in using Metaverse tools effectively.

b. Federal and provincial governments may subsidies or give grants to institutes to acquire VR apparatus and ensure access to high-speed internet in marginalized regions.

c. Institutes may team up with metaverse developers to produce subject-specific immersive modules, like virtual labs, project-based learning in 3D environments, history recreations, virtual field trips, and language immersion environments.

d. Experts may low-cost metaverse platforms such as text-to-speech, sign language interpreters, and custom avatars for students with disabilities.

e. Longitudinal studies may be conducted to get in-depth insights into how virtual environments affect students and teaching-learning processes.

f. Innovative funding models, partnerships, and technological solutions may be searched for to achieve affordable metaverse schooling.

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