Understanding HCI approaches for the Metaverse in Education applications for the Global South

Anmol Srivastava[1], Torkil Clemmensen[2], Pradeep Yammiyavar[3], Pankaj Badoni[4]

[1] IIIT Delhi, Department of Human-Centered Design, New Delhi, India
anmol@iiitd.ac.in

[2] Copenhagen Business School, Frederiksberg, Denmark
tc.digi@cbs.dk

[3] IIT Dharwad, Karnataka, India
pradeepyammi@iitdh.ac.in

[4] University of Petroleum and Energy Studies, Uttarakhand, India
pbadoni@ddn.upes.ac.in

Abstract. The recent adoption of the Metaverse in various sectors indicates its potential for digital transformation. Technologies like XR, where X = Augmented/ Virtual/ Mixed Reality, will be its key enablers and can be powerful tools for developing nations' digital educational transformation. These developing nations are often categorized under the Global South. This workshop presents a first step toward the socio-technical Human-Computer Interaction (HCI) aspects of the Metaverse to understand its impact on education in the Global South. The socio-technical approach helps cover human, social, and organizational factors, leading to more acceptable systems for end users and stakeholders. With the Metaverse, students, and teachers can log in via different immersive devices and experience different virtual environments fabricated to their individual needs, learning, and teaching styles. It will open up possibilities to explore new situations and access facilities that might be impossible due to physical world constraints. Two key concepts will be covered – (i) A socio-technical HCI approach to the Metaverse and (ii) an Interaction Design perspective on Avatar representation and understanding of human work in the Metaverse. This workshop will initiate dialogs on questions: (a) What are the socio-technical issues of the Metaverse for education in the global south? (b) Are there any cross-cultural usability and interaction design concerns regarding digital avatar representation? (c) What considerations will be required for educational Metaverse human-work interaction design?

Keywords: Metaverse, Education, Global South.

1 Introduction

This workshop aims to initiate dialogs on two key concepts - (i) A sociotechnical HCI [1] approach to the Metaverse for education in the Global South, and (ii) an Interaction Design perspective on Avatar representation and understanding of human work in the Metaverse. This workshop will address questions such as: (a) What are the socio-technical issues about the Metaverse for education in the Global South? (b) Are there any cross-cultural usability and interaction design concerns regarding digital avatar representation in the Metaverse? (c) What considerations will be required for educational Metaverse human-work interaction design?

Coined in 1962 by Neil Stephenson, Metaverse gained immense popularity - primarily after the social media giant 'Facebook' rebranded itself as 'Meta.' The Metaverse will be the next paradigm of the internet based on Web 3.0 – blockchain, immersive media, and decentralized networks. It promises many possibilities for digital transformation in various aspects of our physical lives. Although seen more as a virtual space, the Metaverses offer convergence possibilities for both physical and virtual worlds, giving rise to merged and perpetual worlds that coexist and influence each other [2]. It allows a gigantic unified immersive internet as a persistent shared realm. Recent adoptions of the Metaverse are seen in various sectors: like virtual embassies [3], real estate [4], and work-places [5] that indicate its potential for policymaking, business, and computer-supported collaborative work [6]. Published articles have also identified its potential to transform the education sector [7]–[9]. The Metaverse also envisions an amalgamation of technologies such as XR (where X = Augmented /Mixed / Virtual Reality (AR/VR/MR)) by combining all aspects of natural and virtual environments by utilizing various HCI modalities - such as haptics, wearables, and novel user interfaces. Users can access simulated digital ecosystems using their avatars under the duality principle [2]. However, as this field is still in its developmental phase, more insights are required to understand how it can improve the quality of education management in the Global South, especially from a socio-technical HCI perspective.

Metaverse for Education in the Global South: While current education relies on face-to-face teaching methods, it has certain shortcomings in exposing students to an international and multicultural environment [10]. This is mainly due to geographical limitations and the funds available with the institutes. With the Metaverse, this barrier can be reduced. Students and teachers can log in via immersive devices and experience different virtual environments fabricated to their needs, learning, and teaching styles. In addition, it will open up possibilities to explore new situations and access facilities that might not be possible due to physical world constraints.

In this regard, further understanding is on the impact of the Metaverse at an educational, organizational, and societal level. While many studies [6], [11] have shown the effectiveness of XR or virtual worlds in improving students' motivation, there is a lack of understanding of the broader impact of using such technologies in educational institutes and further regarding their implementation, especially in the Global South. For example, while effective, the Metaverse technologies also pose challenges at the organizational level for performance. These concerns go beyond the effectiveness of the technology and generally fall under the socio-technical implications of the use of technology.

Avatar Representation and Human-Work Interaction Design: Inside the Metaverse, students can experience various contexts and learning sessions and collaborate with other students globally via digital avatars or holographic telepresence. Avatars are a digital representation of users in the virtual environment via which they can interact with other users or computer agents. While there have been numerous studies on digital avatars, their influence on cultural usability remains, and students' perception remains arcane. These aspects are crucial to understanding the behavior and motivation of students to interact and engage with fellow peers in the Metaverse. Understanding the social and physiological impacts of the Metaverse and the digital avatars representation thus becomes essential. According to a detailed study on avatars [12], the design and appearance of DAs can influence users' perceptions. However, UX concerns such as cross-cultural usability [13] issues, *perception of gender* [12] *of digital avatars*, and its influence on presence [14] are yet to be understood fully from a sociotechnical HCI perspective. Further, how avatars influence human-work interaction design [15] also requires re-considerations and re-thinking as the virtual world offers new affordances, paradigms, and work environments.

In addition to the UX mentioned above concerns, an important aspect is understanding how the Metaverse can capture the richness of vibrant cultures of the global south. As a diversified, multi-cultural hub, the global south is often viewed as a developing nation group. To capture the essence of the culture, traditions, values, and representations of the global south nations often remains arcane in Metaverse research for education. This concern will eventually gain traction with the formation of virtual communities and digital avatars in an immersive XR environment. Thus, we propose to also shed light upon this aspect of the global south nations to motivate and inspire researchers to consider investigations in this direction.

Figure 1 below presents the design concerns for this workshop.

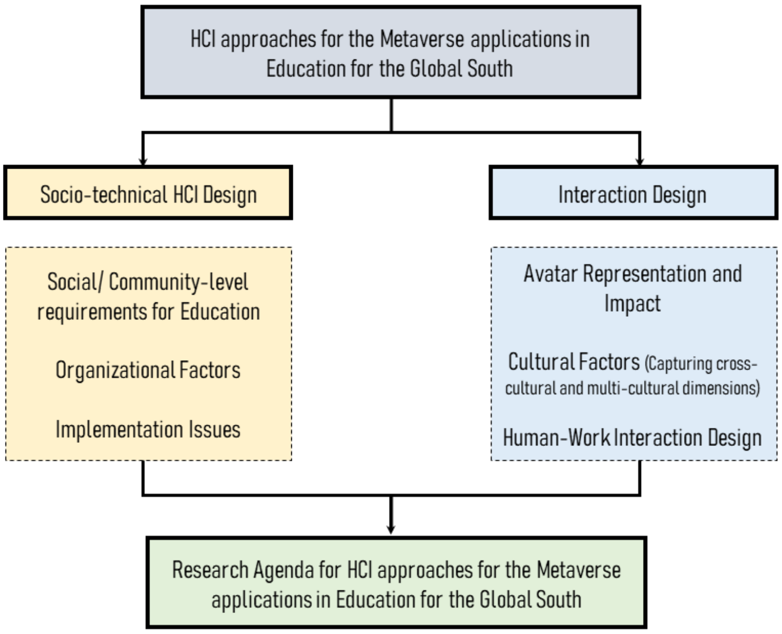

Fig. 1. Design considerations and aspects covered in this workshop

2 Workshop Objectives

This workshop is the first step towards spearheading research towards sociotechnical HCI aspects of the Metaverse to understand its impact on education in the Global South. The objectives of this workshop are to:

- Develop an understanding of the sociotechnical HCI issues about Metaverse for education in the Global South
- Collect examples, experiences, and interdisciplinary research work relevant to user experience and interaction design of Metaverse and digital avatars through a sociotechnical design lens.
- Formulate a research agenda for sociotechnical HCI research on the Metaverse.

3 Expected Outcomes

The workshop will produce a research agenda for designing Metaverse educational experiences in the Global South and provide future direction. In addition, it will help foster critical reflections on the Metaverse through a design lens and bring together researchers working in this area. Extended versions of the workshop papers will be published as workshop proceedings.

4 Target Audience

Designers, researchers, educational technologists, policymakers, and practitioners in socio-technical design, design psychology, HCI, and immersive experience design. Early-stage researchers, Ph.D. scholars, postdocs, and graduate students are also encouraged.

5 Organizing Committee

The following organizers will organize the workshop:

Anmol Srivastava is an Assistant Professor in the Department of Human-Centered Design at IIIT Delhi, where he has initiated an interdisciplinary Creative Interfaces Lab. His research interests are Sociotechnical design, XR, Metaverse, and Tangible Interaction Design. Before joining IIITD, he headed the User Experience & Interaction Design Program and co-founded the XR & IxD Lab at the School of Design, UPES.

Torkil Clemmensen is a Professor at the Department of Digitalization, Copenhagen Business School, Denmark. His research interest is in psychology as a science of design. His research focuses on cultural and psychological perspectives on usability, user experience, and the digitalization of work. He contributes to Human-Computer Interaction, Design, and Information Systems. He is a vice-chair of IFIP TC13 WG8.

Pradeep Yammiyavar is a Professor Emeritus and an Adjunct Professor at IIT Dharwad. He has been working in Creative Design, Innovation, Management & Human-Computer Interaction domains and holds an experience of 34 years. He is a Design

Educator and mentor of National Eminence. He also established India's pioneering UX-UE-UI-IxD HCI Research Lab. In addition, he initiated the Interaction Design specialization stream in IITG's B.Des program in 2003-04, which played a significant role in the success of the Department worldwide.

Pankaj Badoni is an Assistant Professor in the School of Computer Science at UPES, India. He is passionate about teaching game design and development to computer science students. He works in AR/VR, the Metaverse, and computer-generated graphics and imagery.

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