Redesigning Learning Space for Teacher Professional Development: From Traditional PD to Metaverse-based PD

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To address the evolving demand for modern-day classrooms and skills, there is a need to redesign the approach used for teacher training and professional development. This proposed research project aims to explore how teachers perceive the implementation of metaverse-based professional development, using qualitative research methods. The study's findings may provide insights for the redesign of teacher professional development practices, aiming to enhance their effectiveness in the classroom.

Introduction

Teacher professional development (PD) has been implemented as a policy solution to improve teacher quality and help students achieve academic success (Colbert et al., 2008), leading many school districts across the United States to make it mandatory for teachers to engage in PD. Teachers' professional development has in recent times transitioned to online platforms. Teachers now attend professional development entirely online without the need to travel to a physical location. Online professional development is provided through synchronous or asynchronous learning or a blend of the two. Synchronous PD is carried out through webinars or video conferences, while asynchronous learning takes place through Learning Management Systems or by watching assigned videos or lectures. As education evolves, the methods used to provide teacher training and professional development must also evolve.

One emerging approach to preparing teachers for the 21st century is the use of virtual learning spaces, such as metaverse-based PD, which offers new opportunities for immersive and interactive learning experiences (Mo & Mo, 2023). According to Lee (2022), Metaverse is a fully immersive virtual world that is persistent and allows users to interact with each other using digital objects in real time. It is a virtual world where users interact with the real world (Mo & Mo, 2023), and a type of virtual learning space that provides a new way of learning and engaging with information. Recent studies suggest that Metaverse is not a new entity in the domains of Virtual Reality (VR) or Artificial Reality (AR), but rather an integration of emerging technologies, including 5G, Artificial Intelligence (AI), VR, AR, digital twins, blockchain, holography, and IoT (Internet of Things) (Mo & Mo, 2023; Park & Kim, 2022). As a result of the emergence of Metaverse and the 21st-century classroom, it is important to consider the design and implementation of teacher training or PD. Hence, this study will investigate how the use of Metaverse as a type of professional development, specifically known as metaverse-based PD, is perceived by teachers.

Literature Review

Teacher Professional Development

Mitchell (2013) identifies professional development as the process through which teachers acquire or enhance their skills, knowledge, and/or attitudes for improved practice. Teacher PD refers to formal and informal training designed to support teachers' professional growth (Coldwell, 2017). It is considered one of the most effective methods of improving teachers' effectiveness in the classroom (Dash et al., 2012). PD can take various forms, such as workshops, seminars, online (via video conferencing), or in-person conferences.

Metaverse

One of the popular definitions of Metaverse is "the post-reality universe, a perpetual and persistent multiuser environment merging physical reality with digital virtuality" (Mystakidis, 2022, p. 486). It is based on the convergence of technologies that enable multisensory interactions with virtual environments, digital objects, and people, such as virtual reality (VR) and augmented reality (AR) (Mystakidis, 2022). Ng. (2022) also defines metaverse as "a 3D digital virtual world that enables people to "live " and "learn " through their avatars in immersive learning environments" (p. 195).

Metaverse has changed the trajectory of online learning in recent years by providing learners with a more interactive, immersive, and engaging learning experience (Mo & Mo, 2023; Calisir et al., 2022; Zhang et al., 2022). Kye et al. (2021) reviewed four categories of metaverse (i.e., augmented reality, lifelogging, mirror world, and virtual reality) that have been applied in education for years. The authors recommended examining how to teach and learn using the metaverse. In educational settings, metaverse activities have been applied, such as game-based collaboration (Jovanović & Milosavljević, 2022) and problem-solving (Park & Kim, 2022).

Engage VR (https://engagevr.io) and Oculus Quest 2 VR Headset were used for participants to engage with the metaverse experience. Engage is a spatial computing platform designed for educational and professional development purposes. Users can attend classes, events, or training in the virtual worlds that organizations or event organizers created. In order to participate in the Engage VR, participants will wear Oculus Quest 2 and interact with virtual content (Meta, 2023).

Theoretical Framework

Immersive technology is becoming widely adopted in education. However, the theory related to immersive technology that shapes this study is learner engagement. When learners experience an immersive environment like in Metaverse, they engage in the learning content. Meaningful engagement occurs when learners become active learners. Research shows that learner engagement increases the chances of improved learning outcomes (Oprean & Balakrishnan, 2020). Nevertheless, learner engagement does not isolatedly impact learning outcomes because there are other factors involved that increase learning outcomes such as teaching method, implementation, individual learner, and learning content (Oprean & Balakrishnan, 2020).

Learner engagement consists of four elements based on the learner experience's quality including (1) affective states, (2) behavioral states, (3) cognitive engagement, and (4) agentic states (Han et al., 2023). In the affective states, a learner is interested in and enjoys the lesson. In the behavioral states, a learner engages in a task. In cognitive engagement, a learner concentrates on the lesson. In the agentic states, a learner contributes to his/her learning. Han et al. (2023) claim that Metaverse practices could impact learners' experience and improve their learning skills.

Purpose

This research aims to explore how teachers perceive the use of metaverse as a type of professional development, which is referred to as metaverse-based PD. Through examining teachers' perspectives, the study aims to offer valuable understanding to school administrators to aid them in redesigning and implementing teacher professional development. This study will find answers to the following research questions:

1. What are teachers' perceptions of a metaverse-based PD?
2. Do teachers perceive the metaverse-based PD to be engaging in learning?
3. Do teachers perceive the metaverse-based PD to be collaborating with other colleagues?
4. Do teachers perceive that metaverse-based PD enhances their instructional practices?

Method

To address the research questions, a qualitative research design is proposed to provide an understanding of the meaning of respondents' experiences and lifeworlds (Warren, 2011). Researchers will collect data from participants to explore how they perceive the use of metaverse as a type of professional development to have a better understanding of redesigning and implementing a PD that meets technology advancement. Proposed participants will be ten or more certified middle and high school teachers in the Southern region of the United States of America, randomly selected regardless of gender or subject background. Participants will complete a 30-minute metaverse-based PD session using Engage VR (https://engagevr.io) and Oculus Quest 2 VR Headset to enhance their teaching efficacy in the classroom. Engage VR was selected for this proposal because the platform supports different devices, which makes it easily accessible to the participants. During the data collection, participants will be required to participate in pre-intervention, intervention (the PD session), and post-intervention activities. After the PD experience, researchers will interview each of the participants to obtain their views on the application of metaverse as a new approach to conducting teachers' PD. Then, the researchers will analyze the collected data following the thematic analysis technique (Guest et al., 2011).

Figure 1

Pre-Interview Questionnaire

Demographic questions

- What gender do you identify as?
  - Male
  - Female
  - Other:
  - Prefer not to say.
- What is your age?
  - 18 - 24 years old
  - 25 - 34 years old
  - 35 - 44 years old
  - 45+
- What is the highest degree or level of education you have completed?
  - High School
  - Bachelor's Degree
  - Master's Degree
  - Ph.D. or higher

Questions related to metaverse experience.

- Have you ever used Metaverse before?
  - yes
  - no
- If YES, what was your experience with using the metaverse?
- If NO, what is your expectation if you have an opportunity to use a metaverse?

Figure 2

Interview Questions

- How was your experience of using a metaverse-based Professional Development?
    - How was your interaction while using a metaverse-based PD?
- Can you describe the challenges you experience while using a metaverse-based PD?
- How would you expect to use a metaverse application in your professional life?
- How would you describe your overall perception of participating in a metaverse-based professional development (PD) compared to traditional PD formats?
- In your experience with metaverse-based PD, how would you describe the level of engagement and collaboration among teachers?
- Can you provide specific examples that illustrate the collaborative aspects?
- Explain what influence metaverse-based PD would have in your future PD plans.

Timeline of Proposed Study

This proposal is based on an ongoing study where data will be collected in the summer of 2024 due to the teachers' busy schedules and the ongoing IRB application process. The findings of this study may support efforts to improve the design and implementation of teachers' professional development across the globe.

References

Coldwell, M. (2017). Exploring the influence of professional development on teacher careers: A path model approach. *Teaching and teacher education, 61*, 189-198.

Cukurbasi Calisir, E., Sabuncu, F. H., & Altun, E. (2022). Reflections of Metaverse-Based Education on E- Learning. *Online Submission*.

Dash, S., Magidin de Kramer, R., O'Dwyer, L. M., Masters, J., & Russell, M. (2012). Impact of online professional development or teacher quality and student achievement in fifth-grade mathematics. *Journal of research on technology in education, 45*(1), 1-26.

Guest, G., MacQueen, K. M., & Namey, E. E. (2011). *Applied thematic analysis*. sage publications.

Han, Z., Tu, Y., & Huang, C. (2023). A framework for Constructing a Technology-enhanced Education Metaverse: Learner Engagement with Human–machine Collaboration. *IEEE Transactions on Learning Technologies*.

Jovanović, A., & Milosavljević, A. (2022). VoRtex Metaverse platform for gamified collaborative learning. *Electronics, 11*(3), 317.

Kye, B., Han, N., Kim, E., Park, Y., & Jo, S. (2021). Educational applications of metaverse: possibilities and limitations. J*ournal of educational evaluation for health professions, 18*.

Lee, L. H., Zhou, P., Braud, T., & Hui, P. (2022). What is the metaverse? an immersive cyberspace and open challenges. *arXiv preprint arXiv:2206.03018*.

Meta. (2023). *Get Started with Meta Quest 2*. https://www.meta.com/quest/products/quest-2/

Mitchell, R. (2013). What is professional development, how does it occur in individuals, and how may it be used by educational leaders and managers for the purpose of school improvement?. *Professional development in education, 39*(3), 387-400. http://dx.doi.org/10.1080/19415257.2012.762721

Mo, J., & Mo, F. (2023). A Study of Online Learning Context Optimization Strategies under the Metaverse Perspective. *Journal of Education, Society and Behavioural Science, 36*(1), 30-42.

Mystakidis, S. (2022). *Metaverse. Encyclopedia, 2*(1), 486-497.

Ng, D. T. K. (2022). What is the metaverse? Definitions, technologies and the community of inquiry. *Australasian Journal of Educational Technology, 38*(4), 190-205. DOI: https://doi.org/10.14742/ajet.7945

Oprean, D. & Balakrishnan, B. (2020). From Engagement to User Experience: A Theoretical Perspective Towards Immersive Learning. In M. Schmidt, A. A. Tawfik, I. Jahnke, & Y. Earnshaw (Eds.), *Learner and User Experience Research: An Introduction for the Field of Learning Design & Technology.* EdTech Books. https://edtechbooks.org/ux/10_from_engagement_t

Park, S. M., & Kim, Y. G. (2022). A metaverse: taxonomy, components, applications, and open challenges. *IEEE access, 10,* 4209-4251. https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=9667507

Zhang, X., Chen, Y., Hu, L., & Wang, Y. (2022). The metaverse in education: Definition, framework, features, potential applications, challenges, and future research topics. *Frontiers in Psychology, 13*.