Perspective

# Art gamification (and digital/media arts) for special school: New thinking shifts for inclusive metaverse's engineering

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**Abstract:** The paper briefly describes the incorporation of several complementary subjects of art, technology, digital, and media to support the implementation of educational accessibility. The general goal is to promote the accessible metaverse for special schools related to the participation of students with different types of disability, assuming the motivation of digital/media arts activities in various interactive tools. This methodology was carried out in a documentary review to investigate the different elements of the virtual world through a metaverse analysis and new interactive tools such as school gamification. The key steps include investigating accessibility needs, creating interactive media, providing training, implementing virtual reality, and promoting social interaction; however, there are ten pillars to highlight the potential of metaverse engineering for inclusive learning in special schools, fostering creativity and collaboration while ensuring accessibility. In conclusion, metaverse educational accessibility in special schools for digital/media arts enables progress and learning through interactive tools, promoting social interaction and inclusion.

**Keywords:** media arts; art education; educational technology; inclusive school; student; teacher; metaverse engineering; theory

## 1. Introduction

Accessibility in the metaverse exists in various definitions through inclusion and diversity to explore virtual impact and new engineering practices on the evolution of interactive tools—of virtual reality (VR), augmented reality (AR), mixed reality (MR), and extended reality (XR), delivered in immersive 3D experience (hyperrealistic, digital environments, digital twins, virtual twins, and others)—to generate the interconnected social transformation, of course, to guarantee diversity and equality through service accessibility to persons with disability [1–4]. What is the reason for the topics related to the arts, education, and especially disability and the virtual world? The research developed in the accessible metaverse is not prepared to provide interactive educational, artistic, and digital experiences such as game-based learning (gamification) [5–8], depending on the student's motivation or the inclusive school.

Currently, many special schools are incorporating various complementary subjects such as art education, technological education, media arts, digital arts, sound art, and others [9,10]. There is the impact of education on scientific collaborators to jointly interpret the metaverse field of art education—through artistic appreciation and creation—for human consciousness, including the frontier of educational research and the new future of the inclusive school [11]. However, it is difficult to include the new advanced technology of attention-accessible educational activities to dabble in the interactive tools that work towards the future of inclusive metaverse for school with the participation of students with different types of disability.

## 1.1. General goal

The general goal is to promote the accessible metaverse for special schools related to the participation of students with different types of disability, assuming the motivation of digital/media arts activities in various interactive tools.

## 1.2. Specific goals

The specific goals are:
- To create an inclusive virtual space in the metaverse accessible to all special schools.
- To open the doors of creativity through digital/media arts for the virtual educational community.
- To incorporate the accessibility of interactive resources for all students with different types of disability.
- To propose interactive tools for new technology in special education.
- To improve the equality of digital education accessible to knowledge for all.
- To participate in social interaction and the disability community in the metaverse.
- To improve the literary and artistic experiences for the community with disability, such as inclusive exhibitions of digital art and media arts.

## 2. Theoretical background

### 2.1. Research on the art gamification during the COVID-19 pandemic

Several studies raised the educational experience of all special schools during the COVID-19 pandemic, as well as e-inclusion by Italian law requirement for all students with disability to integrate regular activities by incorporating between classrooms and teachers, and yet, many special educators have demonstrated high levels of mental health to provide different additional supports [12–15]. Many special schools suffered from the COVID-19 outbreak and were closed to prevent the spread of the health crisis, although there has been additional study on teacher preparation through challenging perceptions and educational experiences [16–18].

The study of art gamification [12,13] is to meet a series of research problems based on existing rigorous theory and prior research findings in the classroom with educational needs [19]. What were the main theoretical ideas that directed your study? The main ideas through the theory of art gamification support the documentation and connection of the educational metaverse study within the education schools by incorporating specialist students (or students with different types or degrees of disability), underpinning this research project consistently.

Inclusive metaverse technology works with interactive education, especially social interaction, providing equitable access to new insights from virtual experience and physical/digital space. There is no mainstreaming of the inclusive technology theme of the metaverse for art education during COVID-19.

### 2.2. Metaverse accessibility problem

The metaverse accessibility is far to support special education schools for students with different types and degrees of disability to generate new technological instruments, such as software engineering within the artistic and creative fields,

supporting the motivation of learning based on educational gamification [1–4,20,21]. Documentation does not exist to connect the main ideas through metaverse project-based studies accessible to special education schools. Most engineers prefer funding obtained with high impact to create the educational project in regular schools (not related to students with disabilities), but there is an increase in the general participation of students to take advantage of innovative projects of metaverse's software engineering.

## 3. Literature review

During the COVID-19 pandemic, the metaverse was popularized as the concept of sci-fi such as films, books (or novels), and Facebook's technology company to generate the new scenario in which they operate on the head-mounted display (HMD), as well as cyberspace and virtual representation (or avatar) [22]. This motivation of digital literacy in school makes it possible to know the overcoming of digital resources for educational technology despite the decrease in the educational experience for students with disability on the incorporation of the metaverse, but included the teaching is not prepared from the adaptability to broaden the education task, of course, to challenge educational innovation by educators towards an inclusive environment [15,23–26].

## 4. Methodology

This methodology was carried out in a documentary review to investigate the different elements of the virtual world through a metaverse analysis and new interactive tools such as school gamification. The impact of new technology not only transformed life, but also profoundly changed the school, the learning spaces, and the educational exchange [27]. In the course of COVID-19, health crisis has unveiled not only the deficiencies of the educational system but also the potentialities of technology in the education service to carry out the teaching process in other environments different from traditional learning (in-person classes) [28]. It is impossible that the greater majority of the metaverse was not ready to incorporate inclusive gamification within the special school. Nevertheless, the metaverse engineering experts were not available to go one step further, and it was impossible to create a user experience (UX) exclusively for students with different types of disability [29].

There was no documentary or non-experimental study to complement the art gamification proposal with software engineering. It made it impossible to verify some works of the educational subject of digital/media art through the incorporation of inclusive metaverse.

## 5. Results

These results are then analyzed in small samples of gamification and software engineering in a metaverse for special schools to deepen the preliminary metaverse proposal (**Figure 1** and **Table 1**). The key steps include investigating accessibility needs, creating interactive media, providing training, implementing virtual reality, and promoting social interaction.
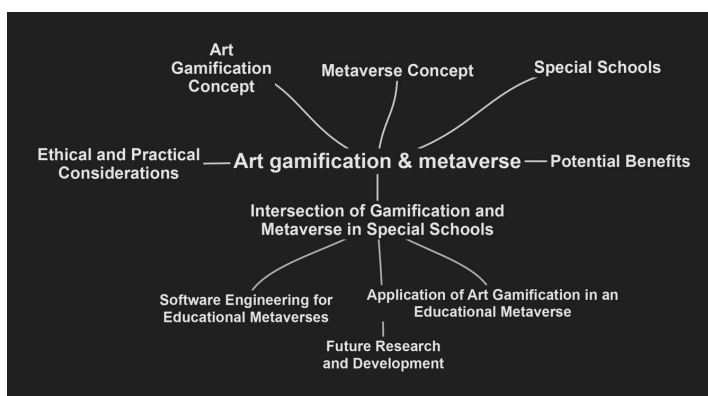
**Figure 1.** Conceptual map (Source: Self-made).

**Table 1.** Types and keys.

| Types | Keys |
| --- | --- |
| Art gamification concept | Definition of art gamification |
| | Use of game elements in non-game contexts |
| | Objectives of gamification in education |
| Metaverse concept | Definition of metaverse and virtual environments |
| | Examples of metaverse platforms |
| | Educational applications of metaverses |
| Special schools | Definition of special schools and their focus on special educational needs |
| | Challenges and goals of inclusive education |
| Intersection of gamification and metaverse in special schools | Use of gamification in virtual environments |
| | Gamification potential for motivation and engagement in students with special needs |
| Software engineering for educational metaverses | Development of virtual platforms for education |
| | Interaction design and customization |
| | Security and privacy in educational virtual environments |
| Application of art gamification in an educational metaverse | Integration of game elements in artistic activities |
| | Creation of challenges and rewards related to art |
| | Encouragement of creativity and collaboration |
| Potential benefits | Increase in student participation and motivation |
| | Stimulation of artistic expression and creativity |
| | Improvement in social interaction and communication |
| Ethical and practical considerations | Privacy and data security for students |
| | Accessibility for students with diverse skills |
| | Evaluation and tracking of student progress |
| Future research and development | Case studies in special schools implementing gamification in metaverses |
| | Design of guidelines and best practices for successful implementation |
| | Assessment of impact on learning and emotional well-being |

Source: Self-made.

# 6. Analysis and discussions

Not always the metaverse projects for digital/media arts that do not benefit from the most accessible virtual educational resources for future students during gamification or educational game learning process. However, this project seeks to train special education teachers on the metaverse teaching of digital/media arts to develop the didactic contents of the different virtual subjects. There are no curricular subjects in the teaching-learning process of the most accessible educational virtuality. These virtual environments will mean a larger scale of the metaverse engineering proposal for technological innovation, such as gamification towards equal school adaptation to different individual and collective needs.

In the new metaverse identity, socio-educational and ethical considerations have influenced user behavior and impacted the level of the teaching-learning process within the special school [30–33]. This influence depends on the interactive tools used for students with different types of disability, aimed at motivating them and preventing school failure, as well as virtual bullying. It exists in various metaverse instruments and tools across the study to identify a sample series of argumentation in different fields [34]. Next, to achieve both the general goal and the specific goals of promoting the accessible metaverse in the special school and, of course, the participation of students with different types of disability to carry out a methodology focused on the implementation of inclusive technology and digital/media arts activities, supporting interactive media such as digital game-based learning. The key steps of the proposal are the following:

1) Investigation and design of the inclusive virtual space: It is an investigation to identify the specific accessibility needs of students with different types of disability in the special school. It is difficult to obtain research findings to design an inclusive virtual space in the metaverse that meets accessibility standards and allows for the active participation of all students.

2) Development of digital art resources and interactive media: It is possible to create the development of virtual digital/media arts resources for students with different types of disability, promoting new creative and expressive tools. These resources facilitate the use of virtual design, such as metaverse engineering, depending on the UX roles and weather they are accessible and adaptable to meet the needs of students with disability within the classroom.

3) Educational training and technology activity: It is possible to provide training in classroom activities using technology for teachers and teaching assistants within the special school using interactive metaverse tools, ensuring an innovative experience, such as UX and gamification educational experiences, to familiarize them with the subject of digital/media arts.

4) Implementation of virtual reality technology: Interactive tool technology for special education is integrated into the accessible environment, enhancing virtual accessibility and adaptive physical virtuality to provide new game-based learning opportunities for all students with different types of disability.

5) Promotion of participation and social interaction: It is possible to promote the active participation of the educational community of the special school in the accessible metaverse, interacting the social-emotional ability among students and creating a more inclusive virtual environment to foster mutual support and

collaborative learning.

It is important to know the implementation list of metaverse engineering and engineering for university accessibility to transform the recreational activities made by digital art and media arts. Implementing effective strategies to foster bonding through virtual environments and interactive media in the special school classroom, but not be challenging.

There are ten pillars to contribute to the future of metaverse engineering with universal accessibility to transform art gamification within the special school:

1) Metaverse engineering has great potential to enhance the overall learning experience in the virtual classroom of special schools.

2) Virtual environments and interactive media can provide unique opportunities for students with disability to engage in inclusive learning activities.

3) Integration's metaverse technology in special schools can facilitate better communication and interaction among students and teachers.

4) Metaverse engineering enables new personalized learning experiences, meeting the basic needs and specific abilities of each student with different types of disability.

5) Gamification elements within the metaverse can motivate students with disability and promote active participation in educational activities.

6) Virtual simulations and immersive experiences in the metaverse can aid in practical skill development and real-life application of knowledge.

7) Metaverse-based education encourages creativity and artistic expression, benefiting students with different types of disability in subjects like digital arts and media.

8) Metaverse platforms extend learning beyond the classroom, promoting continuous learning and exploration.

9) Collaborative projects and group activities in the metaverse foster teamwork and social skills development among the students involved.

10) Metaverse engineering can contribute to creating an inclusive and accessible learning environment, promoting equal opportunities for all students in special schools.

These pillars aim to drive metaverse engineering, ensuring universal accessibility and revolutionizing art gamification in special schools. On the other hand, there is no recommendation for digital/media arts with metaverse; however, it is possible for the users to increase visual contrast, adjust the direction and volume of sound, and meet other accessibility needs; they can also access services remotely, such as sign language interpretation for deaf students [35].

## 7. Conclusions

In conclusion, the educational accessibility of metaverse in the special school for digital/media arts allows progress and learning about the new experiences of interactive tools for the learning community, both teachers and assistant teachers' classroom management, such as students with different types of disability. In addition, social interaction and inclusion's promotion in the metaverse to incorporate the most advanced set of engineering specialists with universal accessibility to create inclusive gamification, strengthening the community, and encouraging the active participation

of students.

It needs to propose the new norm (or new recommendation) of educational accessibility in the inclusive metaverse to transform the quality of service in the most advanced engineering, of course, avoiding the imminent risk, i.e., it gets serious for students and teachers in the ministry of education who are affected by the violation of privacy or ethics through educational gamification in art. Most engineering and education experts warned about the need to control the art gamification system to prevent identity theft and failure of game-based learning. It is very difficult to obtain the results or the quality of learning through the inclusive metaverse within the subject of the arts to build the inclusive educational metaverse.

Finally, it needs to permanently improve the future agreement of the local government together with the institutions (companies, universities, and research centers) related to AI engineering for special education. All interactive instruments are free and unlimited for all special schools. It is very important to motivate both students and teachers by supporting art and creative gamification in different subjects.

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# References

1. Zallio M, Clarkson PJ. Designing the metaverse: A study on inclusion, diversity, equity, accessibility and safety for digital immersive environments. Telematics and Informatics. 2022, 75: 101909. doi: 10.1016/j.tele.2022.101909
2. Zallio M, Clarkson PJ. Inclusive Metaverse. How Businesses Can Maximize Opportunities to Deliver an Accessible, Inclusive, Safe Metaverse that Guarantees Equity and Diversity. Technical Report ENG-TR.013. Engineering Design Centre Inclusive Design Group, University of Cambridge; 2022.
3. Parker C, Yoo S, Lee Y, et al. Towards an inclusive and accessible metaverse. In: Proceedings of the Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems (CHI EA 2023); 23–28 April 2023; Hamburg, Germany. pp. 1–5. doi: 10.1145/3544549.3573811
4. Fernandes F, Werner C. Accessibility in the metaverse: Are we prepared? In: Proceedings of the XIII Workshop on Aspects of Human-Computer Interaction for the Social Web; 17 October 2022; Diamantina, Brazilian. pp. 9–15. doi: 10.5753/waihcws.2022.226618
5. Dahalan F, Alias N, Shaharom MSN. Gamification and game based learning for vocational education and training: A systematic literature review. Education and Information Technologies. 2023. doi: 10.1007/s10639-022-11548-w
6. Camacho-Sánchez R, Rillo-Albert A, Lavega-Burgués P. Gamified digital game-based learning as a pedagogical strategy: Student academic performance and motivation. Applied Sciences. 2022, 12(21): 11214. doi: 10.3390/app122111214
7. Thiell ML. Exploring using game-based learning and gamification in a secondary classroom to increase engagement. Available online: https://scholarworks.gvsu.edu/gradprojects/216/ (accessed on 12 October 2023).
8. de Carvalho CV, Coelho A. Game-based learning, gamification in education and serious games. Computers. 2022, 11(3): 36. doi: 10.3390/computers11030036
9. Bernaschina D. ICTs and media arts: The new digital age in the inclusive school. Alteridad. 2019, 14(1): 39–50. doi: 10.17163/alt.v14n1.2019.03
10. Bernaschina D. Incorporation of media arts for Chilean young students with special learning needs. Journal of International Education and Practice. 2022, 5(2): 23–28. doi: 10.30564/jiep.v5i2.5038
11. Chen X, Zon D, Xie H, Wang FL. Metaverse in education: Contributors, cooperations, and research themes. IEEE Transactions on Learning Technologies. 2023, 1–18. doi: 10.1109/TLT.2023.3277952
12. Bogdanic J, Vuk S. Gamification in art education as a learning approach to sustainable development. In: Proceedings of the 4th Interdisciplinary and Virtual Conference on Arts in Education; 11–12 May 2022; Madrid, España. pp. 257–262.
13. Tagie G, Merman H, Taharuddin NS, Ibrahim NA. Gamification in art and design appreciation. Kupas Seni. 2022, 10(2): 93–103. doi: 10.37134/kupasseni.vol10.sp.2.9.2022
14. Parmigiani D, Benigno V, Giusto M, et al. E-inclusion: Online special education in Italy during the COVID-19 pandemic. Technology, Pedagogy and Education. 2021, 30(1): 111–124. doi: 10.1080/1475939X.2020.1856714
15. Hurwitz S, Garman-McClaine B, Carlock K. Special education for students with autism during the COVID-19 pandemic: "Each day brings new challenges". Autism. 2022, 26(4): 889–899. doi: 10.1177/13623613211035935
16. Yakut AD. Educators' experiences in special education institutions during the COVID-19 outbreak. Journal of Research in Special Educational Needs. 2021, 21(4): 345–354. doi: 10.1111/1471-3802.12533
17. Glessner MM, Johnson SA. The experiences and perceptions of practicing special education teachers during the COVID-19

pandemic. The Interactive Journal of Global Leadership and Learning. 2020, 1(2). doi: 10.55354/2692-3394.1013

18. Toquero CMD. 'Sana all' inclusive education amid COVID-19: Challenges, strategies, and prospects of special education teachers. International and Multidisciplinary Journal of Social Sciences. 2021, 10(1): 30–51. doi: 10.17583/rimcis.2020.6316

19. Delgado-Valdivieso K, Sevilla-Vallejo S, Suarez-Monzón N. Gamification and artistic education. History of education and application to the classroom with educational needs. Journal of Namibian Studies: History Politics Culture. 2023, 33(2): 3253–3275. doi: 10.59670/jns.v33i.967

20. Seigneur JM, Choukou MA. How should metaverse augment humans with disabilities? In: Proceedings of the 13th Augmented Human International Conference (AH 2022); 26–27 May 2022; Winnipeg, MB, Canada. pp. 1–6. doi: 10.1145/3532525.3532534

21. Codish D, Ravid G. Detecting playfulness in educational gamification through behavior patterns. IBM Journal of Research and Development. 2015, 59(6): 6:1–6:14. doi: 10.1147/JRD.2015.2459651

22. Ratan R, Lei Y. What is the metaverse? 2 media and information experts explain. Available online: https://theconversation.com/what-is-the-metaverse-2-media-and-information-experts-explain-165731 (accessed on 12 October 2023).

23. Ratten V. The post COVID-19 pandemic era: Changes in teaching and learning methods for management educators. The International Journal of Management Education. 2023, 21(2): 100777. doi: 10.1016/j.ijme.2023.100777

24. Wood G. The global market for management education. In: Dameron S, Durand T (editors). The Future of Management Education, 1st ed. Routledge; 2022. pp. 13–27. doi: 10.4324/9781003095903-3

*25.* Bastian A, Liza LO, Efastri SM. Revolutionizing education: How digital literacy is transforming inclusive classrooms in post-COVID 19. Journal of Public Health. 2023, 45(3): e609–e610. doi: 10.1093/pubmed/fdad058

26. Nelson A. How COVID-19 has affected special education students. Available online: https://now.tufts.edu/2020/09/29/how-covid-19-has-affected-special-education-students (accessed on 12 October 2023).

27. Fabiano A. Metaverse and new educational and inclusive paradigm. Some reflexions. Journal of Inclusive Methodology and Technology in Learning and Teaching. 2023, 3(2): 1–12.

28. López-Belmonte J, Pozo-Sánchez S, Moreno-Guerrero AJ, Marín-Marín JA. We've reached the GOAL. Teaching methodology for transforming learning in the METAVERSE. A teaching innovation project. Metaverse Basic and Applied Research. 2023, 2(30). doi: 10.56294/mr202330

29. Yusril AN. E-accessibility analysis in user experience for people with disabilities. Indonesian Journal of Disability Studies. 2020, 7(1): 106–109. doi: 10.21776/ub.ijds.2019.007.01.12

30. Kaddoura S, Al Husseiny F. The rising trend of metaverse in education: Challenges, opportunities, and ethical considerations. PeerJ Computer Science. 2023, 9: e1252. doi: 10.7717/peerj-cs.1252

31. Yu W, Chua TJ, Zhao J. Virtual reality in metaverse over wireless networks with user-centered deep reinforcement learning. Available online: https://arxiv.org/abs/2303.04349 (accessed on 12 October 2023).

*32.* Yu W, Chua TJ, Zhao J. User-centric heterogeneous-action deep reinforcement learning for virtual reality in the metaverse over wireless networks. IEEE Transactions on Wireless Communications. 2023. doi: 10.1109/TWC.2023.3277226

33. Lacity M, Mullins JK, Kuai L. What type of metaverse will we create? Available online: https://bpb-us-e1.wpmucdn.com/wordpressua.uark.edu/dist/5/444/files/2022/10/2022_02_BCoEWhitePaperMetaverse5493.pdf (accessed on 12 October 2023).

34. Lévy P, Zapata Ros M. Visions of three-dimensional or virtual workspaces, metaverses, and education. Virtual reality and learning: Presentation of the special issue and conclusions. Distance Education Journal. 2023, 23(73): 1–8. doi: 10.6018/red.554591

35. Felix A. An accessible, disability-inclusive metaverse? Available online: https://www.edf-feph.org/an-accessible-disability-inclusive-metaverse/#:~:text=In%20the%20Metaverse%2C%20users%20can,such%20as%20sign%20language%20interpretation (accessed on 12 October 2023).