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Can Virtual Worlds be used as Intelligent Tutoring Systems to innovate teaching and learning methods? Future challenges for Metaverse and Artificial Intelligence in education.

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INTRODUCTION & AIM

The rapid evolution of digital technologies is transforming the educational land scape by offering new, suistanable and interactive teaching methodologies.
Virtual Worlds (VW) are emerging as risk-free, immersive environments that foster critical skills such aus critical thinking, creativity, communication and collaboration, while enhancing digital literacy,
Similarly, Intelligent Tutoring Sistems (ITS), powered by Artificial Intelligence, are providing adaptive, student –centered learning experiences.
This study aims to explore the characteristics of VW and ITS through recent case studies, highlighting their potential synergies and the challenges of combining Metaverse technolgies with AI in education

METHOD

To evaluate the feasibility of VW as ITS, a Literature Review, a Case Study Analysis and a Synthesis of Findings were conducted.
In particular:

- *Literature Review* analyzed recent studies on the educational use of VW and ITS and identified key features, benefits and limitations of both systems;
- *Case Study Analysis* first evaluated case studied involving VW to determine their impact on student engagement and learning outcomes, then compared findings with data on ITS implementations;
- *Synthesis of Findings* mapped overlapping characteristics to identify potential integration pathways.

RESULTS & DISCUSSION

VW enable risk-free simulations and interactive environments, encouraging collaborative knowledge constuction and improving engagement.
Furthermore they support critical life skills development.

Likewise, ITS deliver personalize feedback and adaptive learning paths, enhancing learning efficenty and accomodate diverse learning styles.

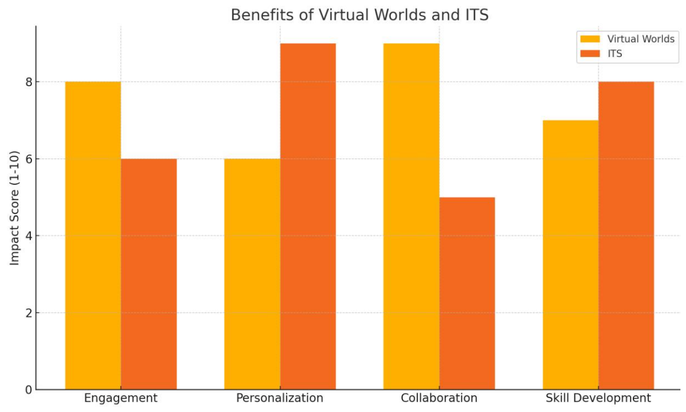

Figure 1. *Benefits of VW and ITS.*

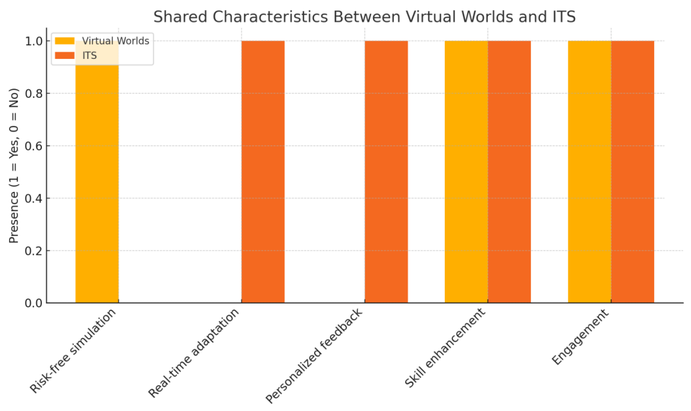

Figure 2. *Shared characteristics between VW and ITS.*

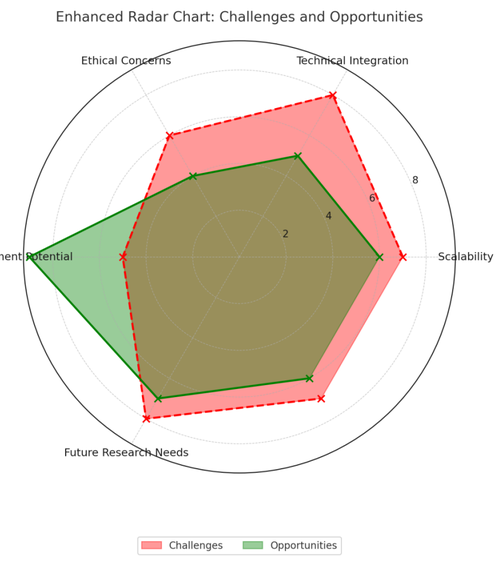

Figure 3. *Challanges and Opportunities.*

VW could leverage ITS for dynamic, real-time adaptation of content. The combination of these systems could create engaging, personalized and scalable learning experiences capable of meeting the future educational needs.
However, despite the opportunities linked to engagement potential, and the educational advantages linked to accesibility and collaboration, future challenges will concern the technical barriers to favor the integration of AI in VW, and the ethical concerns about data privacy and AI bias in education.

CONCLUSION

The integration of VW and ITS represents a promising avenue for innovation in education, combining immersive experiences with adaptive intelligence to create personalized, interactive and effective learning systems

FUTURE WORK / REFERENCES

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