Special issue: The adoption of decentralized Artificial Intelligence tools in education

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Digital technologies are triggering a profound transformation in the educational landscape, introducing new methodologies and tools for learning and teaching in schools and universities. Artificial Intelligence (AI) is positioned as one of the most innovative frontiers, promising to personalize educational experiences and enhance teachers' skills. However, the rapid adoption of these technologies raises crucial questions regarding accessibility, data centralization, digital control and reliability of learning processes.

In this context of profound change, ROSA Journal, focused on the dynamics of Web3, presents this Special Issue dedicated to the exploration of the role of decentralized Artificial Intelligence tools in the educational field. The aim is to analyze how Web3 technologies - based on blockchain, decentralization and interoperability - can contribute to outline a more inclusive, transparent and safe education.

This Special Issue aims to investigate models and practices that, through decentralization, promote the autonomy of students and teachers, guarantee data privacy and stimulate innovation in schools and universities.

The intersection of Web3 and AI is shaping a new digital paradigm with profound implications for education. While AI promises to personalize learning, streamline instructional processes, and enhance teaching effectiveness, Web3's decentralized architecture introduces the principles of data ownership, transparency, and democratic accessibility. This technological convergence is paving the way for an era where education can be reimagined as a more equitable, student-centered, and community-governed endeavor.

The combination of decentralized AI and Web3 – based on blockchain – allows for the democratization of knowledge, allowing students to create and manage their own educational data in a secure and transparent way. This approach not only personalizes teaching, adapting it to individual needs, but also promotes equity, eliminating barriers such as limited access to resources. For example, AI tools on blockchain could track student progress on decentralized ledgers, ensuring privacy and data ownership, while Web3 facilitates learning in virtual environments such as the metaverse.

Traditionally, education platforms are centralized, leading to issues of data privacy, control, and dependency on a few large players. Decentralization offers a solution to these problems by distributing control and ownership across a network of participants. This not only increases the security and resilience of education systems, but also strengthens user autonomy. This Special Issue therefore aims to highlight how these technologies make education more democratic, with students and teachers actively participating in the governance of educational systems, fostering a creative economy where knowledge is fairly monetized.

Decentralized AI excels in areas such as personalization, data privacy, and user empowerment, reflecting its ability to deliver more targeted and individually controlled education.

This special issue welcomes investigations, studies, and research in STEM and educational disciplines, preferably with scientific evidence, that are relevant to the ideas described and topics presented below.

Topics

For this Special Issue of ROSA Journal, the following themes have been identified as crucial to fully explore the intersection of decentralized AI and Web3 in education. These topics are designed to stimulate innovative research and practical case studies, offering a comprehensive view of the opportunities and challenges.

Personalized and Adaptive Learning Models

• Experiences and use cases of tools that use decentralization and distributed data analytics to personalize student learning and assessment paths.

• Implementation of AI algorithms on decentralized networks to adapt content and teaching methods to the individual needs of students, while ensuring respect for data privacy.

• Using decentralized AI to provide immediate feedback and personalized support to students, exploring " learner-owned data" models and their impact on personalized learning.

Transparency and Security in the Academic Path

• How blockchain technologies can be used to issue, verify and manage certificates, diplomas and micro-credentials in an immutable and secure way.

• The role of digital wallets in enabling students to own and control their learning data and skills.

• Blockchain solutions and decentralized algorithms for the secure and transparent management of students' and teachers' personal data, addressing privacy protection challenges.

Integration and Impact of Decentralized Platforms

• Analysis of the challenges and opportunities in adopting decentralized systems (e.g. collaboration tools, course management, skills assessment) in traditional schools and universities.

• The role of educational Decentralized Autonomous Organizations (DAOs) in the governance of resources and in the definition of training paths.

• Case studies on the integration of decentralized AI in primary, secondary and higher education (e.g. gamification, project-based learning, classroom management) and innovations in higher education such as academic DAOs and tokenization of education.

Autonomy and participation of teachers and students

• Reflections on how decentralization and AI can redefine the role of the teacher as facilitator and of the student as active protagonist of their own learning and educational governance.

• How Web3 and AI can enable students to create, own, and monetize educational content and their own intellectual output (e.g. through NFTs for academic works), fueling a "creator economy" in education.

• AI as a support tool for decentralized collaboration and collective knowledge creation, promoting DAO models for the governance of educational systems.

Ethics, Transparency and Sustainability

• Discussion on ethical principles, algorithmic transparency and accountability in the design and use of decentralized education systems, addressing issues such as algorithmic bias and the AI "black box".

• Cybersecurity aspects in Web3 and AI platforms for education and considerations on the environmental sustainability of blockchain technologies.

• Analysis of sustainable practices for the implementation of decentralized AI tools at school and university level, with particular attention to costs, interoperability and maintenance.

Conclusions

The Special Issue of ROSA Journal on the use of decentralized Artificial Intelligence tools in teaching represents a fundamental initiative to explore the frontiers of educational innovation. The convergence of AI and Web3 not only promises to personalize and democratize learning, but also offers concrete solutions to current challenges related to privacy, security and accessibility. Through the analysis of innovative models, case studies and ethical discussions, this Special Issue aims to stimulate an inclusive debate and serve as a guide for future evolutions of STEM and education in the era of Web3 and decentralized AI. The goal is to build a more equitable, transparent and student- and teacher-serving educational ecosystem, where technology and pedagogy come together to train the citizens of the future.

Details

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