EMPOWERING HOME TUTORS: A BLOCKCHAIN-BASED CREDENTIAL VERIFICATION FRAMEWORK WITH DATA-DRIVEN MARKET ANALYTICS

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ABSTRACT

This paper introduces an end-to-end system that uses cryptographic validations of credentials and data-driven market systems to improve trust, transparency, and efficiency within the home tutoring system. The study reveals three major threats, such as credential fraud, information asymmetry, and ineffectiveness in tutor-parent matchmaking, by formulating a hybrid framework that is based on Hyperledger Fabric to conduct decentralized credential checks and to create a Power BI-SQL-Python analytics pipeline to make real-time market knowledge. Based on the Design Science Research (DSR) approach, the system was created, deployed and tested on the performance, usability and economic levels. It was demonstrated that blockchain verification cut credential validation time by several days to less than a second, no frauds were detected, and the average throughput of blockchain was 427 transactions per second. Within minutes, the analytics component processed more than 100,000 records and several tutors and parents were provided with dynamic dashboards to make informed decisions. Empirical studies including 16 respondents have shown the growth of parental trust by 52 percent, tutor income by 23 percent, and a 93 percent decrease in (institutional) verification costs, which proves the socio-technical and economic feasibility of the framework. It makes its theoretical contribution to an existing knowledge base by extending the theory of trust to a computation-based setting and pragmatic contribution to the study by illustrating how blockchain and analytics can collaboratively be used to empower digital education markets using verifiable credentials and intelligent insights. The framework will offer a template of creating trustworthy, information data-driven, and clear educational ecosystems and can be implemented to larger fields, like e-learning, certification schemes, and management of academic credentials.

Keywords: Blockchain; Credential Verification; Educational Technology; Hyperledger Fabric; Market Transparency.