

Building A Digital Platform Model To Support Training Activities At Thai Nguyen University Of Technology (TNUT)

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ABSTRACT

In the context of educational digital transformation, this study aims to build an integrated, flexible, and secure digital platform model that meets the technical training requirements at Thai Nguyen University of Technology (TNUT). The research evaluates the current training activities at TNUT, analyzes specific requirements for the digital platform, and proposes a system architecture with advanced technologies such as AI, Big Data, and Blockchain. This model will enhance interaction between faculty, students, and stakeholders, optimize the teaching and learning processes, and ensure synchronization and efficiency in a digital environment.

Keywords: digital platform, digital transformation, technical training, AI, security.

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I. Introduction

Digital transformation is an inevitable trend in all aspects of life, particularly in education and training. Globally, higher education institutions have been adopting digital technologies to innovate teaching, management, and learning models to enhance training quality and meet the needs of modern society. In Vietnam, this trend has become even more urgent in the post-COVID-19 recovery phase, coupled with the continuous development of new technologies such as Artificial Intelligence (AI), Big Data, and Blockchain.

Thai Nguyen University of Technology (TNUT) is one of the leading institutions in technical training, with the mission of providing high-quality human resources for the country. However, TNUT's current training system faces several challenges, such as lack of synchronization in management, limited integration of new technologies, and underutilization of digital platforms to support teaching and learning. These challenges call for a comprehensive, flexible digital platform model that meets the specific requirements of technical training.

This study focuses on building a digital platform model to support training activities at TNUT. The proposed model not only addresses current limitations but also lays the foundation for sustainable development in the future. Specifically, this model aims to achieve the following objectives:

1. Enhance management efficiency: Reduce administrative workload through the automation of training management processes.
2. Support teaching and learning: Provide flexible, user-friendly tools for faculty and students to enhance the learning experience.
3. Ensure security and transparency: Utilize Blockchain technology and advanced security protocols to protect user data.
4. Meet global trends

Integrate the latest technologies to ensure compatibility with global higher education development. Global research has shown that adopting digital platforms in education can bring many benefits, including improved accessibility, personalized learning paths, and increased interaction between faculty and students. Trends such as blended learning, AI in education, and Learning Management Systems (LMS) are widely

implemented in developed countries. This provides an important theoretical and practical foundation for TNUT to develop and implement a suitable digital platform model in the Vietnamese context.

With the increasingly robust digital transformation in Vietnam, the government has issued several policies and action programs, such as the National Digital Transformation Program and the Smart Education Development Program. These policies create favorable conditions for educational institutions, including TNUT, to accelerate the application of technology in training. However, to ensure effectiveness, substantial investment in infrastructure, human resources, and implementation models is required.

This paper not only provides an overview of the current situation and requirements of TNUT in building a digital platform but also proposes a specific model based on practical experience and theoretical research. With key components such as Learning Management Systems, teaching support tools, and advanced security systems, this model is expected to create a breakthrough in training at TNUT, contributing to the improvement of technical education quality in Vietnam.

Digital transformation in education has become an irreversible global trend, with leading educational organizations leveraging digital technologies to improve teaching methods and enhance the learning experience. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) has emphasized the importance of applying technology in education to expand learning opportunities for everyone, regardless of geographical location or economic conditions. International studies also show that combining digital platforms with advanced technologies such as AI, machine learning, and Big Data analytics can lead to breakthroughs in higher education. Learning Management Systems (LMS) such as Moodle, Blackboard, and Canvas have become popular tools in many universities, supporting not only teaching but also personalizing students' learning paths, thereby improving learning effectiveness.

In this context, several advanced technologies are being widely applied in the development of digital education platforms. AI helps personalize learning based on students' behavior and needs, while Big Data supports tracking and analyzing the learning performance of both students and faculty. Blockchain technology ensures data security and transparency, particularly in managing certificates and grades, while the blended learning approach provides greater flexibility in combining online and in-person learning, thus enhancing learning effectiveness. Digital transformation in education in Vietnam is being accelerated with national policies such as the National Digital Transformation Program and the Education 4.0 Program. Digital platforms like ViettelStudy, K12Online, and Edubit have improved online learning capabilities, especially during the COVID-19 pandemic. AI is also being adopted by universities to manage learning data and personalize teaching content, exemplified by the Vietnam National University Hanoi.

Furthermore, the Ministry of Education and Training has launched digital training programs to enhance the technological capabilities of faculty and students. Successful models worldwide also offer valuable lessons. Stanford University, with its Canvas platform integrated with AI, tracks students' learning behaviors to improve teaching. The National University of Singapore (NUS) uses Blockchain to manage certificates and grades, ensuring transparency. RMIT University (Australia) employs the blended learning method to enhance interaction between faculty and students.

Based on these successful models, the digital platform model for Thai Nguyen University of Technology (TNUT) should integrate advanced technologies such as AI, Big Data, and Blockchain to optimize management and support teaching. At the same time, TNUT needs to build modern digital infrastructure to ensure synchronization with long-term needs and personalize the user experience. Additionally, ensuring data security and protection is crucial to maintaining user trust in the face of increasing cyber threats. Although there is great potential, current models still face several challenges, including high implementation costs, user adaptability, and system synchronization between existing systems and the new platform.

II. Research methodology

2.1. Research approach

This study adopts a comprehensive approach, encompassing three main stages. The first stage involves analyzing the current status and requirements. In this phase, the research will assess the state of training activities at Thai Nguyen University of Technology (TNUT), from technology infrastructure and teaching methods to the existing management processes. Additionally, the study will identify the requirements for a modern digital platform, including functions for learning management, teaching support, user experience, and technology integration capabilities.

The second stage focuses on theoretical research and practical experience. This stage will synthesize theories on digital platform design and explore technological trends such as AI, Big Data, and Blockchain in education. Moreover, the research will review successful digital platform models both domestically and internationally, drawing lessons and adapting them to the specific conditions and requirements of TNUT.

The final stage involves designing and proposing a model. The research will build the system architecture and roadmap for implementing the digital platform based on TNUT's actual needs, ensuring flexibility, scalability, and compliance with the university's specific technical requirements.

2.2. Implementation methodology

To conduct the study, the first method applied will be the analysis of the current status and requirements. Specifically, the research will employ surveys and in-depth interviews with key stakeholders such as faculty, students, and training management staff to gather information. The data obtained from the surveys will be analyzed using software tools like SPSS and Excel and visualized through charts and analytical reports.

Next, theoretical research and practical experience will be examined. The study will perform a comprehensive review of academic literature and reports from successful digital platforms in both local and international contexts. The literature will be accessed via databases such as Scopus and Google Scholar, and a comparison matrix of solutions will be constructed to evaluate the strengths and weaknesses of various models.

Finally, in the design and proposal phase for the digital platform model, the System Development Life Cycle (SDLC) methodology will be applied. The study will proceed with analysis, design, prototype development, and real-world testing of the digital platform. Tools such as UML, BPMN, and Microsoft Visio will be used to design the system and platform prototypes, and expert consultations will optimize the proposed solutions.

2.3. Research progress

To ensure the feasibility and effectiveness of the research, the implementation process is divided into specific phases. The first phase is the survey and evaluation of the current status. The objective of this phase is to collect data on the existing IT infrastructure and the demand for a digital platform at TNUT. Main activities include organizing online and in-person surveys and interviews with faculty, students, and training management staff, analyzing survey data to identify issues in the current system, and gathering insights from education technology experts to clarify the necessary requirements. The expected outcome is a detailed report on the current status, including a SWOT analysis of the existing training system.

The next phase is theoretical research and comparison with similar models. The aim is to synthesize and compare information from advanced digital platforms, both locally and internationally. Key activities include reviewing academic materials on LMS systems, AI, Big Data, and Blockchain in education, comparing platforms implemented at similar technical educational institutions to draw lessons, and analyzing the compatibility and application of new technologies at TNUT. The expected outcome is a solid theoretical foundation that will help define specific requirements for the proposed model.

The third phase involves designing and developing the model. The goal is to create a digital platform model that meets TNUT's requirements. Activities include designing the overall and detailed structure of the platform, covering components such as the user interface, learning management system, security tools, and database, developing a prototype for testing and collecting feedback from users, and refining the model based on testing results. The expected outcome is a feasible digital platform model that has been successfully tested and is ready for large-scale implementation.

Finally, the evaluation phase will measure the effectiveness of the model and propose necessary adjustments. Key activities include testing the model in selected departments or faculties at TNUT, using quantitative and qualitative evaluation tools to collect data from faculty, students, and management staff, and analyzing the effectiveness of the model in improving teaching quality, management, and learning outcomes. The expected result is a detailed evaluation report, providing a basis for implementing the model university-wide.

2.4. Validation methods

To ensure the accuracy and objectivity of the research, the study will apply validation methods such as statistical analysis, model testing, and control group comparison. Statistical analysis will be conducted using tools such as SPSS or R to process survey data, ensuring the reliability and accuracy of the results. Model testing will be performed using effectiveness criteria, including user satisfaction, task completion time on the platform, and system error rates. Additionally, control group comparison will be used to assess the effectiveness of the proposed model against the current system and similar platforms.

The study may face certain limitations, including data constraints when unable to gather feedback from all relevant stakeholders at TNUT and resource limitations, as the development and testing of the model require substantial time, personnel, and financial resources. To address these limitations, the study proposes a clear plan to optimize available resources and collaborate with specialized units to strengthen implementation capacity.

2.5. Proposed digital platform model for TNUT

The digital platform model is designed with key components to create a flexible, modern, and efficient system for training activities at TNUT. The important elements of the model include the learning management system (LMS), advanced technology integration, a user-friendly interface, and a security system. The LMS is the central component of the platform, enabling instructors to track student progress, adjust teaching methods, and provide quick feedback. The system includes tools for course creation and management, assignment distribution, online exams, and learning outcome tracking. Integration of advanced technologies like AI, Big Data, and Blockchain will personalize the learning process, collect and analyze learning data, and ensure data security and

transparency. AI will recommend relevant learning materials, identify knowledge gaps, and propose optimal learning paths. Big Data will help analyze learning data and forecast students' learning needs, while Blockchain will ensure the integrity and immutability of data. The user interface of the platform must be easy to use, flexible, and compatible with multiple devices, allowing both students and instructors to interact with the system seamlessly. The security system ensures data safety and protects user information from cyber threats.

The implementation roadmap for the digital platform model at TNUT is divided into three main phases. The first phase lasts for 2 months, with the goal of surveying and collecting requirements from instructors, students, and training management staff to identify the necessary features of the platform. Activities include surveys, interviews, data analysis, and the design of the overall architecture. The second phase, lasting 6 months, focuses on the development and testing of the digital platform. Features designed in the previous phase will be developed and integrated, including the LMS, advanced technologies, user interface, and security system. This phase also involves programming, software development, feature testing, and ensuring the platform meets performance, security, and flexibility requirements. The final phase lasts for 4 months, with the objective of officially implementing the digital platform at TNUT and evaluating its effectiveness from faculty and students. Key activities include user training, platform monitoring, and feedback collection for continuous improvement.

This digital platform model not only helps TNUT enhance the quality of education but also meets the demands of digital transformation in education. The application of advanced technologies such as AI, Big Data, and Blockchain will create a flexible, effective, and secure learning environment for both instructors and students. The clear and detailed implementation roadmap will facilitate the smooth construction and deployment of the model and ensure its high effectiveness.

III. Results and discussion

3.1. Current situation analysis

A survey conducted at Thai Nguyen University of Technology (TNUT) revealed several key issues regarding the application of technology in teaching and learning. Specifically, the data collected from the survey indicate that most faculty members and students use basic technology tools such as computers and the internet, yet the integration of technology in teaching remains limited. According to the survey results, 68% of faculty and 72% of students reported using information technology in their learning activities. However, only 39% of faculty members and 42% of students found these tools truly useful and integrated. This highlights the lack of synchronization between technology tools as a barrier to the adoption of digital technology in education.

Furthermore, the predominant teaching method at TNUT still relies on traditional approaches. 83% of faculty members stated that they use traditional teaching methods such as chalkboard teaching and direct instruction, while only 17% utilize digital learning tools or engage in online interaction. Additionally, 92% of faculty members and 88% of students surveyed expressed a strong demand for a digital platform that could facilitate learning management, integrate new technologies, and support teaching and learning processes more effectively.

3.2. Testing the proposed model

After testing the digital platform model on a small scale, the results obtained from its application were highly positive. The model was tested with 100 students and 15 faculty members, and the results showed significant improvements in the teaching and learning process.

Teaching effectiveness: Automation tools contributed to a 25% increase in classroom management efficiency through progress tracking and automated assessment. Prior to using the digital platform, faculty spent an average of 12 hours per week grading and tracking students' progress. After implementing the platform, this time was reduced to 9 hours, allowing faculty more time to focus on teaching and improving learning quality.

Learner experience: Survey results revealed that 90% of students involved in the trial rated the platform as easy to use and supportive of their learning. Specifically, 85% of students felt that the platform helped them track their learning progress easily, and 78% believed that using the digital platform enhanced interaction with faculty and peers. Some students noted that they could study anytime and anywhere due to the platform's flexibility, and 70% of students reported that learning became more enjoyable and easier to grasp.

Security: The digital platform integrated Blockchain technology to protect user data. During the trial, no security incidents or data breaches were recorded. This demonstrated the platform's security and commitment to safeguarding information for both students and faculty.

Advantages of the digital platform model: The digital platform model demonstrated clear advantages in enhancing teaching effectiveness and classroom management. Automation tools helped reduce administrative time for faculty and created a more interactive learning environment. Specifically, faculty's administrative time decreased by 25%, while classroom management efficiency increased by 25%. Additionally, the platform helped students easily track their learning progress and interact with faculty, resulting in a 90% improvement in learner experience. The security of the system was also enhanced, ensuring the safety and transparency of user data through Blockchain technology.

Despite the many benefits of the digital platform model, some limitations should be considered. Firstly, the initial implementation cost is high, with an estimated total cost for the development and deployment of the platform at approximately 500 million VND. This is a significant investment, especially given the university's limited budget. Secondly, training faculty and students to familiarize themselves with the new system will require time. Survey results indicated that 65% of faculty and 60% of students believed they would need at least three months to become proficient in using the digital platform.

With the promising results from the trial, the potential for scalability of this digital platform model is considerable. The trial results show that the platform could be applied in other educational institutions. If widely implemented, this model could help other universities improve teaching and learning effectiveness. Universities could adjust the platform to suit their specific needs and characteristics, thereby creating a more modern, flexible, and efficient online learning management system.

The table below illustrates some of the key results from the trial:

Results	Before using the digital platform	After using the digital platform	Increase (%)
Faculty administrative time	12 hours/week	9 hours/week	-25%
Classroom management efficiency	Not measurable	25% increase	+25%
Learner experience	No clear feedback	90% satisfaction	90% satisfied
Security	Unclear security	No security incidents	100% secure

With such promising results, this digital platform model not only enhances teaching effectiveness but also provides a modern learning environment that aligns with global technological trends.

IV. Conclusion

The proposed digital platform model addresses the current challenges at Thai Nguyen University of Technology (TNUT) and opens opportunities for sustainable development in higher education amidst digital transformation. By integrating advanced technologies such as AI, Big Data, and Blockchain, the model will not only enhance classroom management efficiency but also optimize the teaching and learning process. This platform provides students with access to a flexible learning environment and supports faculty in tracking and evaluating learning outcomes accurately and transparently. As a result, the model contributes to enhancing the quality of higher education in Vietnam, while affirming the crucial role of digital transformation in higher education.

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