© IJARW | ISSN (O) - 2582-1008
April 2026 | Vol. 7 Issue. 10
www.ijarw.com

DIGITAL TRANSFORMATION IN EDUCATIONAL ASSESSMENT AND TESTING PROCESSES: AN EMPIRICAL STUDY BASED ON THE TAM MODEL AT HIGHER EDUCATION INSTITUTIONS IN NORTHERN MOUNTAIN REGIONS OF VIETNAM

Le Bich Lien

Thai Nguyen University of Education, Thai Nguyen City, Vietnam

ABSTRACT

In the context of the ongoing global digital transformation, the application of digital technology in educational assessment and testing has become an inevitable trend for higher education institutions. However, the implementation of digital assessment systems in areas with limited socio-economic conditions, especially mountainous regions, still faces many challenges. This study aims to analyze the factors influencing the acceptance and application of digital assessment systems in higher education in the mountainous region of Northern Vietnam. The study uses a Technology Acceptance Model (TAM) combined with the digital divide to build the research model and test hypotheses. Data was collected from 350 lecturers and students from higher education institutions in the study area. Structural Equation Modeling (SEM) was used to test the relationships between variables in the model. The research findings indicate that perceptions of ease of use and perceived usefulness significantly influence the intention to use digital assessment systems. Simultaneously, the digital divide negatively impacts the adoption of digital assessment technologies. The study provides important implications for education administrators in developing digital transformation strategies tailored to the conditions of mountainous regions.

Keyword: Digital transformation, Digital evaluation, Higher education, TAM, Digital gap, SEM.

1. INTRODUCTION

In recent years, digital transformation has become one of the important development trends in many areas of social life, especially in the field of education. The application of digital technology not only helps to improve the efficiency of management and teaching but also creates new methods in evaluating the learning outcomes of students. Digital transformation in education is becoming a global trend, contributing to changes in teaching and assessment methods in higher education (Selwyn, 2016). According to a report by the Organization for Economic Cooperation and Development (OECD), integrating digital technology into education can contribute to improving teaching quality and enhancing learners' access to education.

In higher education, assessment and testing play a crucial role in measuring student learning outcomes and evaluating the effectiveness of the teaching process. Traditional assessment methods such as written exams or in-person oral examinations are gradually being replaced or supplemented by online assessment methods such as learning management system (LMS) tests, electronic assignments, or automated assessment systems.

Although the application of digital technology in educational assessment offers many benefits, the implementation of digital assessment systems still faces many challenges, especially in areas with limited socio-economic conditions. In Vietnam, the northern mountainous region, encompassing many provinces with complex terrain and unevenly developed information technology infrastructure, creates barriers to the deployment of online learning and assessment systems in higher education.

Furthermore, the digital divide between urban and rural areas significantly impacts the access to technology for faculty and students. According to UNESCO (2023), the digital divide can exacerbate

inequality in education if countries do not have appropriate policies to support groups with limited access to technology.

Stemming from the above issues, this study was conducted to analyze the factors influencing the acceptance and application of digital assessment systems in higher education in the mountainous region of Northern Vietnam. The study uses the Technology Acceptance Model (TAM) combined with the digital gap factor to build the research model and test hypotheses.

2. RESEARCH OVERVIEW

2.1. Digital transformation in education

Digital transformation in education is the process of applying digital technology and the Internet to the field of education to improve the quality of teaching, learning, and educational management, creating a modern, flexible, and equitable learning environment. This is an inevitable trend in the context of the ongoing Fourth Industrial Revolution, especially in the field of education, which trains human resources with comprehensive skills and qualities to meet the requirements of the digital age and international integration. Some key aspects of digital transformation in education include innovating teaching and learning methods through the use of e-learning, smart classrooms, blended learning models, and virtual reality; digitizing educational management, including building large databases to manage student, teacher, and school records; using electronic student records, cashless payments; and developing digital learning resource repositories through the creation of online libraries, e-lectures, and shared learning resources. Digital transformation in education empowers learners with greater control over their time, personalizes their learning paths, increases interaction and creative thinking, reduces administrative workload for teachers, provides innovative teaching tools, allows for close monitoring of student progress, and enables administrators to optimize operations and management based on real-time data, leading to more accurate decision-making. According to Selwyn (2016), digital technology can bring about significant changes in the way educational activities are organized, from providing learning content to evaluating learners' learning outcomes.

The development of online learning platforms and learning management systems (LMS) has facilitated the implementation of digital assessment methods in higher education. These systems enable faculty to conduct online tests, collect learning data, and provide rapid feedback to students.

2.2. Numerical Assessment in Higher Education

Digital assessment in higher education is the process of using technology, data, and benchmarks to measure the level of digital maturity, teaching effectiveness, and management at universities . This is an inevitable trend aimed at improving quality, personalizing learning, and modernizing governance. The focus of the assessment is on measuring digital maturity, which means measuring the technological infrastructure, the digital capabilities of faculty and students, as well as the level of application of information technology in management; or online assessment such as using question banks, AI for personalization, online exams, and competency tests, which are particularly popular in the new trend; or managing and monitoring learning data to evaluate student progress and results. This assessment is based on international assessment frameworks, self-assessment by the university, and management software such as LMS, etc.

According to Bearman et al. (2020), digital assessment can help improve transparency, reduce the cost of organizing exams, and enhance the ability to analyze learning data.

In addition, digital assessment systems allow for the application of various assessment methods such as online multiple-choice tests, project assignments, electronic learning portfolios, and peer assessment.

Thus, it can be said that assessment in education will help increase flexibility, transparency, personalized learning, and data-driven decision-making. In Vietnam, digital transformation is being accelerated in assessment, including computer-based competency exams and annual digital school assessments. Digital assessment is not just a technical matter, but a change in the culture and operational methods of higher education in the digital age. However, assessment in education also poses many challenges such as high infrastructure investment costs, uneven digital skills among staff, cybersecurity, and changes in traditional habits.

2.3. Technology Acceptance Model (TAM

The TAM model is a theoretical framework developed by Fred Davis in 1989 to understand and predict how users adopt and use new technologies. The main goal of this model is to explain how users adopt and use new technologies through two core elements :

- Perceived Usefulness - PU): This is the degree to which a person believes that using a particular system will improve their work performance. In other words, if users feel that technology can help them complete their work more efficiently, they will be more likely to adopt and use it.

- Perceived Ease of Use - PEOU): This is the level at which a person believes that using the system will not require much effort. If a technology is perceived as easy to use, with a user-friendly interface and minimal learning requirements, users will readily adopt and use it.

These two factors are closely related: a system that is both useful and easy to use will be more readily accepted by users. Perceptions of ease of use can influence perceptions of usefulness; if the system is easy to use, users may perceive it as more useful. Conversely, if the system is perceived as difficult to use, users may not perceive its usefulness.

Understanding these factors helps organizations design technology that aligns with user expectations, thereby improving technology adoption rates and overall user satisfaction.

According to TAM, if users believe that a technology helps them work more efficiently and is easy to use, they will be more likely to accept and use that technology. These two factors influence user attitudes, which in turn shape their intentions to act and lead to actual usage behavior.

Many previous studies have used the TAM model to analyze the adoption of educational technologies such as online learning systems or digital learning platforms (Tarhini et al., 2015).

2.4. The Digital Divide in Education

Vietnam's 2006 Information Technology Law defines "digital divide as the disparity in conditions, ability to use computers and information infrastructure to access information and knowledge resources," meaning it refers to the disparity in access to and use of information technology between different groups in society. According to the World Bank (2022), the digital divide can significantly affect learners' access to education in the context of digital transformation. If not addressed promptly, the digital divide will become a knowledge and career opportunity gap for an entire generation. In the current education and training sector in Vietnam, there are also many issues related to the digital divide, such as the conditions for accessing digital technology to access useful resources for research, teaching, and learning between schools. Schools receive uneven investment in terms of facilities, information technology infrastructure, libraries, and digitized resources. This leads to inequality between faculty and students teaching and learning at large universities with adequate learning support and those at schools lacking access to information and knowledge. Therefore, reducing the digital divide in education requires the collective effort of the entire community. According to UNICEF, the digital divide is synonymous with the learning divide – and this gap will widen as education increasingly demands that learners master digital and technological skills.

3. RESEARCH METHODOLOGY

This study uses a quantitative approach to analyze the factors influencing the acceptance of numerical assessment systems in higher education.

Data was collected from 350 faculty members and students at higher education institutions in the mountainous northern region of Vietnam.

The variables in the study were measured using a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree).

4. RESEARCH RESULTS

The SEM analysis results show that the research model has a good fit with the survey data for the following indicators:

$\chi^2/df = 2.31$

CFI = 0.94RMSEA = 0.056

The hypothesis test results show that:

• Perceptions of ease of use positively influence perceptions of usefulness.

- Perceived usefulness positively influences the intention to use digital rating systems.

- The digital divide has a negative impact on the adoption of digital rating systems.

. 5. DISCUSSION

The research results provide important empirical evidence on the implementation of digital transformation in educational assessment activities at higher education institutions in the mountainous region of Northern Vietnam. Structural equation model analysis reveals the elements in the TAM model. It has the potential to provide a good explanation for the technology adoption behavior of faculty and students in the context of higher education.

First, the research results show that the perception of ease of use is important. It has a positive influence on the perception of usefulness. of the digital assessment system. This result is consistent with the TAM theory proposed by Fred Davis , in which the ease with which users perceive technology to be used increases the likelihood that they will find that technology useful for their work or studies (Davis, 1989). In the context of higher education, if online assessment platforms are designed to be user-friendly and accessible, faculty and students will tend to appreciate the value of these tools in supporting the teaching and learning process.

Secondly, the research results indicate that the perception of the usefulness of digital assessment systems significantly influences the intention to use the technology . This suggests that when instructors and students perceive that using online assessment platforms saves time, improves learning efficiency, or supports assessment process management, they are more likely to accept and use these technologies in practice. This result is consistent with many previous studies on the application of technology in education, in which the perception of the benefits of technology is considered a decisive factor in the acceptance of new technological systems (Tarhini et al., 2015).

Furthermore, the study also showed that perceived ease of use directly influences the intention to use digital assessment systems . This indicates that factors related to user experience play a crucial role in driving digital transformation in education. If online assessment platforms have complex or difficult-to-use interfaces, users may feel uncomfortable using them and therefore reduce their likelihood of adopting the technology.

Another key finding of the study is that the digital divide negatively impacts the adoption of digital assessment systems. This reflects the reality that educational institutions in the northern mountainous region still face significant limitations in technological infrastructure, internet connectivity, and access to learning equipment. According to a UNESCO report (2023), the digital divide can exacerbate inequality in education if countries do not have appropriate policies to support disadvantaged groups.

In the context of higher education in Vietnam, the digital divide can manifest in various forms. Firstly, many students in mountainous areas still lack access to modern learning equipment such as personal computers or tablets . Secondly, internet connectivity in many mountainous areas remains unstable, hindering participation in online learning and assessment activities. Thirdly, the limited technological skills of some faculty and students reduce the effectiveness of digital assessment systems.

The research results also indicate that implementing a hybrid assessment model could be a suitable solution for educational institutions in mountainous areas. This model combines online and in-person assessment methods to leverage the advantages of both approaches. For example, multiple-choice tests can be conducted online to save time and costs, while interactive assessments such as presentations or project defenses can still be held in the classroom.

Furthermore, enhancing the digital skills of faculty and students is also considered a crucial factor in promoting digital transformation in education. According to research by Martin et al. (2020), digital skills training programs can help faculty and students more effectively utilize educational technologies, thereby improving the quality of teaching and learning.

From a theoretical perspective, this study contributes to expanding the TAM model by adding the digital divide factor in the context of higher education in areas with limited development. The research results show that while cognitive factors regarding technology remain important, factors related to infrastructure and access to technology also significantly influence technology adoption.

From a practical perspective, the research findings provide important suggestions for education managers and policymakers in developing digital transformation strategies tailored to the specific conditions of each region. Investing in technological infrastructure, enhancing digital capabilities, and developing flexible assessment models will help educational institutions in mountainous areas better utilize the benefits of digital technology in education.

However, this study also has some limitations. Firstly, the research sample focuses only on a few educational institutions in the northern mountainous region, so the research results may not fully reflect the situation of the entire higher education system in Vietnam. Secondly, the study uses a quantitative survey method, so it does not deeply reflect the experiences and perspectives of lecturers and students regarding the implementation of numerical assessment.

Therefore, future studies could expand the scope of the survey to other areas or incorporate qualitative research methods to better understand the factors influencing digital transformation in education.

6. CONCLUSION

This study analyzed the factors influencing the adoption of digital assessment systems in higher education in the mountainous region of Northern Vietnam. The research results showed that technological awareness plays a significant role in promoting the adoption of digital assessment systems. At the same time, the digital divide remains a significant barrier to digital transformation in education.

Educational institutions need to invest in technological infrastructure, enhance the digital skills of faculty and students, and develop flexible assessment models to maximize the benefits of digital technology in education.

REFERENCES

[1]. Bearman, M., Dawson, P., Boud, D., Bennett, S., Hall, M., Molloy, E., & Joughin, G. (2020). Re-imagining university assessment in a digital world. Assessment & Evaluation in Higher Education, 45(3), 458–471. https://doi.org/10.1080/02602938.2019.1664566.

[2]. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of IT. MIS Quarterly, 13(3), 319–340.

[3]. Martin, F., Polly, D., Wang, C., & Lambert, R. (2020). Faculty readiness for online teaching. Online Learning Journal.

[4]. OECD. (2021). Digital education outlook. OECD Publishing.

[5]. Selwyn, N. (2016). Education and technology. Bloomsbury.

[6]. Tarhini, A., Hone, K., & Liu, X. (2015). Technology acceptance in education. British Journal of Educational Technology.

[7]. UNESCO. (2023). Global education monitoring report. UNESCO.

[8]. World Bank. (2022). Digital transformation in education systems. World Bank.