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An Analytical Framework Considering Factors Affecting the Change of Learning Methods at Universities in Vietnam in the Context of Digital Transformation

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Abstract
Digital transformation is a process whose results can give a completely new look to education, with new methods, ways, techniques, tools and media. This study aims to review the factors affecting the change of learning methods at universities in Vietnam in the context of digital transformation. Through applying the TAM model and TRA model to eveluate the factors affecting the change of learning methods at universities in Vietnam in the context of transformation, it can be expected to get better the learning methods at universities in Vietnam.
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1. Introduction

Digital transformation in education is a process that requires the coordination of many parties, of which the most direct and most affected are the lecturers as the subject of knowledge and skills transmission activities and students as beneficiaries of educational services. The goal of digital transformation is not merely the digitization of documents, the use of digital learning tools and media, but a change in thinking, thereby adjusting teaching and learning methods in order to promote thinking, awareness, and develop learners' maximum initiative and creativity. At that time, education becomes an ecosystem where teaching and learning can take place anytime, anywhere with connected devices. Students can access rich learning materials, freely exchange and discuss. Online universities began to appear, students from all over the world can access the education of more advanced countries, comprehensively develop knowledge and skills to integrate and become successful global population. However, not all universities, students and lecturers are ready to change from the traditional to the new mode of learning, in which the process of transferring knowledge from lecturer to student not necessarily face-to-face communication but with the support of digital platforms such as fully online learning (e-learning) or a combination of e-learning and traditional learning (blended learning).

In the context of a strong global outbreak of the Covid-19 pandemic that has prevented students from going to school, digital transformation has truly become a process whose results can give a completely new look to education with new methods, ways, techniques, tools and media. According to UNICEF, about 168 million pupils and students worldwide have to miss school for nearly a year; 14 countries closed most schools from March 2020 to February 2021; More than 888 million students continue to have their education disrupted due to school closures (UNESCO, 2021). This has disrupted all teaching and learning activities, forcing educational institutions to come up with a timely response to the epidemic so that students "stop going to school but not stop learning". In Vietnam, the Ministry of Education and Training has issued two official letters 795/BGDĐT-GDĐH dated March 13, 2020 and 988/BGDĐT-GDDH dated March 23, 2020 on guidelines for implementing online training at educational institutions, unifying the implementation of distance learning and recognizing accumulated learning results. Whether a challenge or an opportunity, the Covid-19 pandemic has rapidly exerted pressure to accelerate the past predicted trend of education as the “university of the future” (Etzkowitz et al., 2000; Marshall, 2018). Educational institutions have been exploiting opportunities due to inevitable pressure from the Covid-19 pandemic, and at the same time taking advantage of Industry 4.0 to erase the spatial distance, regardless of real time and approaches the quality of world education.

The change in learning methods in universities has been studied a lot both at home and abroad, even the factors affecting the intention and behavior of students to study online have also been deeply studied. However, studies have not clarified the process of changing learning methods from face-to-face to online, and have not analyzed how the transition takes place. Besides, there are no works that mention the context of digital transformation, when Vietnam in general and Vietnamese higher education are moving towards digital transformation. This study conducts an overview of related studies to propose a model of factors affecting the change of students' learning methods at universities in the context of digital transformation, thereby assess the current situation and suggest solutions to promote the change of learning methods for the higher education sector in the future and contribute to the long-term digital transformation of the country.

2. Literature review

Yu and Yu (2010) applied the TBP and TTF research model in their research to better explain the motivation and reasons for students to choose the online learning system. Research has shown that several aspects of usage behavior are determined by users' perceptions of the suitability of technology for online learning platforms. They are also indirectly influenced by attitudes, subjective norms, and perceived behavioral control. Other aspects are influenced by the suitability of individual characteristics with specific needs when performing tasks. The underutilization of system tools may be due to a mismatch between individual needs and task requirements, rather than the general usability of the tools. This study has added to previous work 3 important conclusions: (1) First, the study expands opinions and perspectives on the motivation and intention to choose e-learning methods by emphasizing the concordance between the functions of the e-learning system and the types of individual needs of student; (2) In addition, this model is also time-sensitive in analyzing the development stages of the online learning system. Research also emphasizes the importance of managing student learning through using the right tools at the right time; (3) Finally, this model proposes strategies to reduce students' dysfunctional behaviors. By improving the fit between learners and technology for students, they can realize increased levels of learners' attitudes, behavioral intentions, and usability, which in turn can minimize the occurrence of dysfunctional behaviors.

Hassan (2007) has shown the factors affecting students' acceptance of the online learning system through an opinion-based assessment of 538 university students. Research has shown that the four most important factors including the characteristics of the teacher, the characteristics of the learners, the ability to use and access technology, and the support from the University are the factors that have an impact on students' acceptance of online learning methods. From those factors, the research team found the 8 most influential factors, namely (1) the instructor's attitude towards controlling technology, (2) the instructor's teaching style, (3) Student motivation and technological capabilities, (4) Student interaction, (5) Content and structure of online courses, (6) Ease of connection to the school Internet education, (7) Effective information technology infrastructure and (8) Support from the University in online learning activities.

Ali et al., (2013) conducted a study on the intention and behavior of using an online learning system of 569 undergraduate and graduate students in Lebanon. Research results show that perceived usefulness factors, perceived ease of use are factors that have an impact on technology acceptance and use of online learning systems. In addition, the study using the expanded TAM model also studies other factors such as quality of work life, which is the factor that has the most influence on the intention and behavior of using the online learning system. More specifically, the above study has made the following important conclusions: (1) Perceived usefulness, perceived ease of use, subjective norm, quality of work life positively affect intention to Lebanese students' use of the online learning system; (2) Intent, behavior has a positive influence on the use of online learning system in practice by Lebanese students.

Said et al. (2019) analyzed the external factors related to the TAM model commonly used in previous studies to assess students' acceptance of online learning. The survey was conducted with the participation of 435 students at five different universities in the United Arab Emirates (UAE). The research results show that the quality of the system and the quality of the information have significant positive effects on the ease of use of the students in using the e-learning system. Information quality was found to affect students' perceived usefulness. However, system quality did not show any significant effect on perceived usefulness. This result is in contrast to the results in the study with lecturers by Ali et al., (2013) above. In addition, the results also show that content quality has a positive but insignificant effect on perceived usefulness and perceived ease of use of the e-learning system. Regarding individual characteristics, the results show that the effectiveness of the online learning system, the student's enjoyment has significant positive effects on perceived ease of use.

Fathemac et al., (2015) conducted a study on how beliefs and attitudes of 560 lecturers at 2 American universities affect the intention and behavior of using LMS under optional conditions. The research results show that the factors of self-efficacy, system quality and facilitation conditions significantly affect the use of the online learning system by university lecturers. In addition, the above study also gives some important conclusions in the correlation of factors of the research model such as: (1) The quality of the system has a positive effect on the perceived usefulness and ease of use of lecturers; (2) Self-efficacy has a significant impact on technology use; (3) Facilitation conditions positively affect the attitude of teachers towards using online learning system. This also means that instructors will have a positive attitude towards online learning platforms when the conditions are favourable. When the online learning system is of good quality and the lecturers have confidence in their own ability, they will be less interested in other favorable conditions; (4) When teachers find it easy to use an online learning system, this will make them more aware of the usefulness of the system and have a strong impact on the intention and behavior of using the learning system.

Chu and Chen (2016) based on data collected from students who have registered for online courses at a university in Taiwan through a survey of 201 students, showed that factors such as attitude, ability to perform behaviors, and subjective norms show a positive correlation and influence on online learning intention. Among the factors, attitude and subjective norms have a higher impact than the ability to perform behaviors. According to

the survey, students with more than 6 years of experience in using computers account for 90.5%, nearly half of the surveyed students (49.8%) have used an online learning platform in a year and about 1⁄3 of the students (30.8%) have been using the online platform for 2 to 3 years. From the long experience of using computers and the opportunity to use the online learning platform regularly, the students' attitudes and subjective norms about online learning intentions are positive. Although most have experience in using computers, only 17.9% of the students surveyed used it for more than 3 years, so it can be seen that the student's ability to perform behavior is less influence on intention to learn online than the previous two factors. In which, the intention to learn online is the most obvious manifestation of the transformation of learning methods. It can be seen that the three original factors of the TPB model all positively affect the transformation of learning methods.

Revythi and Tselios (2019) conducted a study on technology acceptance and behavior, intention to use online learning systems (LMS). Research results on 345 students show that social norms, accessibility to the online learning system and self-efficacy significantly affect the intention and behavior of using the online learning system. From there, the study suggests that online learning system developers and stakeholders should focus on these factors to increase the acceptance and effectiveness of learning management systems. The above study has made some important conclusions such as: (1) Based on the research, the intention and behavior of using the online learning system is greatly affected by subjective norms, accessibility to the system, perceived usefulness, self-efficacy, and perceived ease of use, but not affected by year of study; (2) Attitude factor towards online learning is mainly affected by system accessibility and then subjective norm and perceived usefulness but not affected by year of study and perceived ease of use; (3) The perceived usefulness of university students towards the online learning system is mainly influenced by subjective norm and system accessibility. However, perceived ease of use, and year of study had no impact; (4) Finally, students' perception of ease of use is affected by the effectiveness of online self-study, subjective norms, system accessibility, and students' years of study.

Baran et al. (2014), the quality of online curricula in higher education institutions is strongly correlated with approaches aimed at professional development, meeting the needs of online teaching of lecturers. This study proposes a professional development framework integrated into online teaching. The proposed framework recognizes that successful online teaching in higher education is the result of interactions in supportive activities at the instructional, community, and institutional levels. Meanwhile, when it comes to online teaching, Badia et al., (2016) "provide an overview of how lecturers approach online teaching methods and the factors affecting online teaching methods for each lecturer, especially in a fully online university environment". And the results showed that "age", "academic background", "devotion in online teaching", especially "the role of lecturers" in online teaching are important factors in adopting a particular methodology to develop quality online teaching.

In a study on the concerns of lecturers when conducting online teaching, Walters et al. (2017) explored the perceptions of 314 lecturers and the results indicated a significant difference in the way lecturers rated their level of education. Their satisfaction with the student's participation and active learning attitudes based on the experience level of the lecturers, thereby showing alternative approaches to support teachers, especially necessary for those who are new to online teaching. Udo et al. (2011) used a modified SERVQUAL model that includes 5 factors: "empathy", "responsiveness", "assurance", "reliability" and "website content" " to evaluate the influence of online teaching quality on student satisfaction. After analyzing data from 203 students, the final results showed that 4/5 factors (empathy, responsiveness, assurance, website content) play an important role in online teaching. Specifically, "website content" has the most positive influence, while "reliability" has a negligible influence on how students evaluate the quality of online teaching. Finally, the researchers suggest that higher education institutions should pay more attention to the factors that have a large impact on student satisfaction.

Besides, previous studies have also shown some important influencing factors when considering the relationship between online teaching quality and student satisfaction. Rubin et al., (2013) conducted surveys of 605 students who had experienced an online curriculum at Midwestern university and found that the technology used in online lessons created significant difference to the teaching and learning experience. Another conclusion of this study is that student satisfaction with LMS or "learning management system" has an important impact on online teaching. Meanwhile, many studies show that the quality of student interaction in online teaching is closely related to student satisfaction (Dziuban et al., 2015). According to Kuo et al. (2013), interactive structure plays an important role in the online teaching environment. And the interaction between teachers and students is the determining factor of student satisfaction (Powers & Rossman, 1985).

Another study using SERVQUAL to estimate the influence of online teaching quality on learner satisfaction is the study of Uppal et al. (2018). In this study, exploratory factor analysis was performed to find out the validity and reliability of the model and multiple regression analysis. The factors selected for analysis include: 5 factors in the SERVQUAL model (tangibility, assurance, reliability, empathy, responsiveness) and 2 additional factors (content, webpage). The results show that 5 out of 7 factors (except empathy, reliability) have a positive correlation with student satisfaction. According to research by Alqurashi (2019), student satisfaction is used as one of the main factors to evaluate online courses, while perceived learning is considered as an indicator of learning. This study aims to "explore effective online self-learning (OLSE), learner-content interaction (LCI), learner-instructor

interaction (LII), and the learner-learner interaction (LLI) can predict student satisfaction and learning perception". A total of 167 students participated in this study. Regression results show that "the overall model with all four predictors (OLSE, LCI, LII and LLI) has a significant predictive effect on satisfaction and perceived learning". The study also found that "LCI was the strongest and most important predictor of student satisfaction, while OLSE was the strongest and most significant predictor of learning perception. However, LLI did not predict student satisfaction and learning perception." This study suggests that teachers use strategies to enhance students' OLSE, LCI and LII.

3. Proposed Model studies the factors affecting the change of learning methods at universities in the context of digital transformation.

After researching models related to the factors affecting the change of learning methods at universities in the context of digital transformation, the study proposes a model to study the factors affecting the change of learning methods at universities in the context of digital transformation based on the TRA model and TAM model.

3.1. Theory of Reasoned Action - TRA

Theory of Reasoned Action (TRA) developed by two authors Ajzen and Fishbein (1980) argues that the nature of an individual's action is often based on reason or motivation, so each individual often uses a systematically the information available to them and considerations regarding their behavior before they decide to perform or not to perform a behavior. Or it can be understood, before deciding to perform a certain behavior, a person will often consider the possible results or consequences if performing those acts. And from there, that person will choose to perform the behavior that is likely to bring the desired result. Theory of Reasoned Action is modeled in Figure 1, as follows:

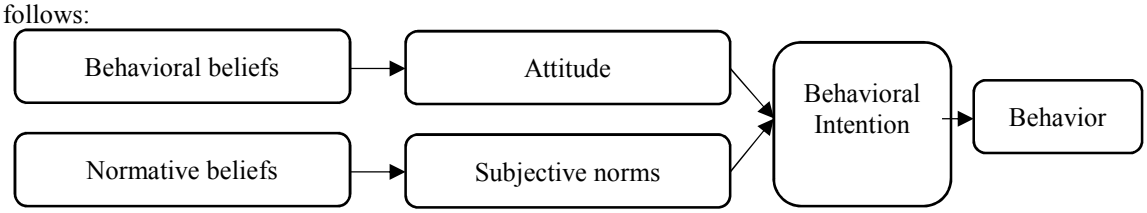

Figure 1. Theory of Reasoned Action

Theory of Reasoned Action holds that "attitude" has been a fundamental conceptual concern of social psychology throughout history because it cannot be considered in the exhaustively available literature. Attitudinal researchers often study theory and select research that makes sense. This selection process has been shifted towards the need for more empirical studies. Fishbein and Ajzen critically evaluated this direction of research, clearly identifying both the conceptual and methodological limitations of previous research, including their own.

Research on attitudes, and in particular on behavioral-vertical relationships, is characterized by clear disagreements, inconsistent methods, and ambiguous findings. Fishbein and Ajzen emphasize the need to distinguish between four classes of variables: beliefs, attitudes, intentions, and behaviors. They also make important assumptions about these variables and about the nature of human behavior. At the highest level of abstraction, Fishbein and Ajzen assume that humans are essentially rational information processors with beliefs, attitudes, intentions, and behaviors determined by the information available to them. .

Fishbein and Ajzen have devoted considerable research attention to the analysis of prejudice, treating this concept sometimes as if it were what they call "global attitudes". If attitudes are unidirectional, then consistent logic requires that this assumption must include having all global attitudes. However, research on prejudice, including some of which cited by Fishbein and Ajzen, suggests that the phenomenon consists of an influence profile rather than a continuous assessment. Fishbein and Ajzen set out to construct a set of related models that address the processes of the formation and change of beliefs, attitudes, and intentions. The resulting structure has intellectually encouraging results. The systems provide at least explanations for certain vexing research inconsistencies. The framework facilitates a clear statement of appropriate research strategies for examining the particular elements of which it is composed. Such work pushes researchers toward a consensus on the existing literature. Although the research has not fully established the theoretical system, the results obtained have a good foundation in the research and a large proportion of the propositions that make up the theoretical framework are testable.

3.2. Technology Acceptance Model – TAM

The Technology Acceptance Model (TAM) is developed from The Reasoned Action Model and expected behavior to predict the acceptance of information technology systems and services (Davis, 1989). The TAM model argues that the two factors "Perceived usefulness" and "Perceived ease of use" play a core role in predicting the results of the "Attitude torwards using" factor. At the same time, the factor "Attitude torwards using " also directly affects

the most core factor of the model, which is the factor "Behavioral Intention to use". This factor is a necessary condition to be able to predict the results of "Actual system use" of the research subjects. The main purpose of the TAM model is to provide an explanation of the overall determinants of technology adoption, which can explain user behavior across all types of new technologies for individual users in particular and the user community in general (Davis, 1989). The TAM model also provides an explanation for the impact of user trust factors including "Perceived usefulness" and "Perceived ease of use" on "Attitude torwards using" and "Behavioral Intention to use" for system information or technology services.

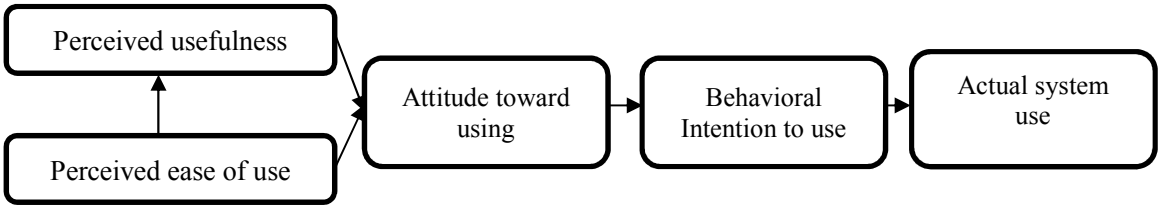

Figure 2. The Technology Acceptance Model (Davis, 1989)

In which, the factor "Perceived ease of use" is defined as the user's confidence in using specific services or systems that do not require much effort. In addition, "perceived usefulness" is described as the belief that a service or system user will improve their job performance (Davis, 1989). According to the TAM model, the factor "Perceived ease of use" directly affects the results of "Perceived usefulness", which indicates that when users have confidence in using the system, they will have confidence in the results that the system brings, but conversely when users lose confidence in using the system, it is very difficult for them to trust the results that the system brings to their work. In addition, "Perceived usefulness" and "Perceived ease of use" are two factors that directly affect the results of the factor "Attitude towards using". "Attitude towards using" is described as a positive or negative feeling about performing a goal behavior (Fishbein & Ajzen, 1974). When an individual has beliefs about the use and confidence about the good effect that the system brings, they will have positive feelings about using that system, conversely, when they lack confidence about using the system and skeptical about the results that the system brings, they will be afraid and have negative feelings about this system.

Not only that, "Behavioral Intention to Use" explains perceived trends or abilities that determine whether or not to use a service or system. Based on the results of that perception, we can predict the level of satisfaction or continued use of the service or the actual level and frequency of using that service. Those are also the explanations for the definition of the factor "Actual system use". Therefore, in the past decade, the TAM model is considered as one of the most popular models to assess the acceptability of new technology services in the field of information technology and telecommunications (Ajzen & Fishbein, 1969; Ajzen, Czasch, & Flood, 2009; Conner & Armitage, 1998).

3.3. Proposed model

According to the literature review and research, this study has considered proposed a structural model of factors affecting the change of learning methods at universities in Vietnam in the context of digital transformation.The research model can be determined as follows (see Figure 3):

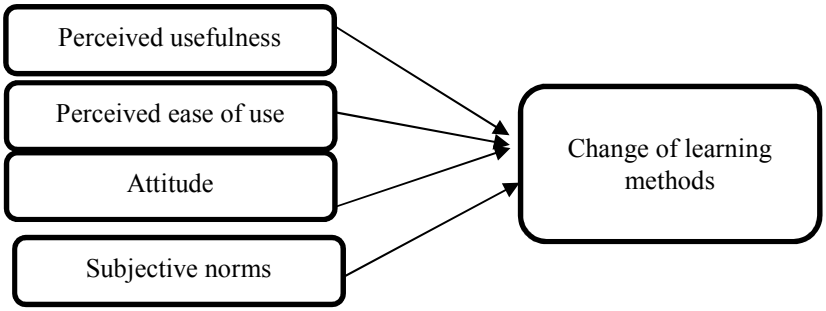

Figure 3. Research model

This research presents the following hypotheses:

H_1: Perceived usefulness significantly impact on change of learning methods
H_2: Perceived ease of use significantly impact on change of learning methods
H_3: Attitudesignificantly impact on change of learning methods
H_4: Subjective norms significantly impact on change of learning methods

4. Proposed methodology

Structural Equation Modeling (SEM) is by far the best known and most widely used path modeling technique in the research literature in the international business and economic analysis environment, according to Hult et al. (2006). The use of Structural Equation Modeling has many outstanding advantages over other techniques such as standard regression analysis because it allows the estimation and evaluation of the entire conceptual model instead of just testing individual hypotheses. Another advantage is the ability to estimate measurement error. A particular advantage for SEM in the international business and economic analysis literature pointed out by Hult (2006) is the ability to compare patterns across groups, a feature useful for related to samples from many countries or cultures. A lesser known path modeling technique is Partial Least Squares (PLS). A similar method to SEM, according to Goodhue et al. (2006) found that PLS is widely used in information systems but is only used sparingly in other areas of management. However, Henseler et al. (2009) show an increasing use of PLS in international marketing literature including a number of marketing studies published in leading international business journals. PLS offers several potential advantages for international business researchers such as a smaller sample size requirement for SEM and no need for distributional assumptions, as well as easier testing of control relationships and built-in capabilities to handle forming indices. However, one shortcoming of PLS is that it does not provide an overall fit statistic for the models. This is a particular limitation for international business researchers where it becomes more difficult to compare multiple groups in the absence of overall relevant statistics.

Based on the literature discussed above, PLS-SEM model was used for the new methodology for evaluating the factors affecting the change of learning methods at universities in Vietnam in the context of digital transformation. The reason for choosing this model is the number of samples is small and the data does not have a normal distribution. PLS-SEM model is used to provide an overall picture of factors affecting the change of learning methods at universities in Vietnam in the context of digital transformation and then is employed to measure the effect of individuals factors affecting the change of learning methods at universities in Vietnam in the context of digital transformation.

5. Conclusion

This study presents a framework and proposes the methodology to determine and evaluate the factors affecting the change of learning methods at universities in Vietnam in the context of digital transformation. Through applying research model proposal to provide an overall picture of factors affecting the change of learning methods at universities in Vietnam in the context of digital transformation and then is employed to measure the effect of individuals factors affecting the change of learning methods at universities in Vietnam in the context of digital transformation. As a result, it can be expected to shed light on promoting the change of learning methods at universities in Vietnam in the context of digital transformation.

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