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Digital Transformation in University Education at Dong Thap University: An Overview

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Abstract : Nowadays, University education in Vietnam is faced with opportunities and challenges that need to be modified to chase up the development of the region and the world. The covid-19 epidemic has altered the form and training organization system at many universities in Vietnam, Dong Thap university (DThU) is not an exception. To keep up with the development tendency of the modern education system, digital transformation is an urgent mission that contributes to enhancing the effic iency and quality of education. This essay will present a view on digital transformation in education at DThU. From actual research, articles that analyze advantages and adversities as well as propose a digital transformation paradigm at DThU to improve training efficiency, and upgrade education productivity in Vietnam and other countries in the region.

Keywords : Digital Transformation, The Covid-19 Epidemic, University Education, University Management.

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I. Introduction

When the Covid-19 pandemic outbreak, the Norwegian government apply a social distancing direction on March 12, 2020, Oslo university spent just a week on its transition to digital education. This is made possible by the competence of senior leadership and the Information Technology department, which have provided effective training services to 5000 employees and 28,000 students (Bygstad et al. 2022). This success was also conducted by the trainers participating in the training who had transited traditional lectures into video lectures for a short time; and students who accept new situations, trying their best to change and adapt to new educational conditions. In addition, many other universities around the world have success in the same way (Crawford et al. 2020)(Dick, Akbulut, and Matta 2020).

How can they become so successful like this? How does digital transformation affect higher education? The answer is that universities have been pioneers in digital transformation and they have spent many years constitute digital transformation solutions. Administrative and training systems that had successfully digitalized before the pandemic, such as student management systems, human resources, and financial management systems, were implemented in the 1980s and 1990s. Educational systems, such as Learning Management Systems (LMS), MOOCs,

Course Websites, and Digital Library Systems, were applied after the 2000s. Digital learning materials have been developed by faculty as part of scientific research in their perspective fields (Crawford et al. 2020). When the Covid-19 crisis occurred, most universities had a digital solution available to deal with the pandemic and most students were ready to study online in times of crisis (Tang et al. 2021).

In Vietnam, while the Covid-19 epidemic is complicated, the Vietnamese Government implemented social distancing according to Directive No. 16/CT-TTG (X. P. Nguyen 2020). Schools must be closed, and pupils and students at all levels of education have to change to adapt to new learning conditions. During this period, most of Vietnam's universities were facing difficulties, the first solution that no one wants is for students to stop going to school, the major reason for this delay is that most universities are not technologically prepared to adapt to pre-disaster changes. However, the good news is that Dong Thap University has been invested in facilities and apparatuses for a long time, thus it has gradually changed and adapted, and the centralized learning solution has been replaced by a management learning system (MLS) using MOODLE technology (Huynh-Cam, Agrawal, and Chen 2021), combining Google Meet and BigblueButton tools.

Prime Minister of Vietnam had approved the project "Building a learning society throughout the period from 2021-2030", the important goal of the Project is to build a lifelong learning society in the context of digital transformation, applying the achievements of the 4th industrial revolution, everyone will have the opportunity to study regularly, lifelong learning, have a chance to become a global citizen (Vu 2021). Vietnam's Ministry of Education & Training also actively implements activities to build a learning society where all citizens (from students, working classes, ...) have the opportunity to study, towards work: learn anything, at any time, anywhere, and lifelong learning (H. Do Nguyen 2021). Dong Thap University is a school directly under the Ministry of Education and Training. During the COVID pandemic, the leaders of Dong Thap University have given out a policy, step by step digital transformation of education and training activities at the University. The school's mission is "training highly qualified human resources in diverse fields, in which education science and teacher training are the core; doing scientific research and providing community services; contribute to socio-economic development in the Mekong Delta and the whole country. Striving to become a high-quality training and scientific research center of Vietnam and Southeast Asia." To fulfill the vision mission, the leadership team and their staff as well as their University's students have agreed that the theme for the 2021-2022 school year is "Digital transformation and rapid adaptation" to strongly promote transformation in the areas of i) university governance and ii) training methods in the digital transformation period. In which, emphasis is placed on the change in management and administration methods of the School, teaching-learning methods; change and unify the perception among managers, officials, and students of the whole University about the contents of digital transformation in the field of education. Determining the role, meaning, and key tasks of digital transformation as a basis for mobilizing overall strength, helping the implementation process become convenient and synchronous. Likewise, building a DThU digital education ecosystem in the field of administration, online public services, tools to support management and administration of the University, tools to support digital training, digital libraries, innovation methods teaching-learning methods, methods of testing, and assessed learners. This article introduces the digital transformation activities at Dong Thap University, problems and challenges in digital transformation activities, the general model of the digital education ecosystem.

2. Related Works

The Covid-19 crisis has accelerated the digital transformation of university education institutions in Vietnam and around the world. Digital transformation in university education involves vision, strategy, people, processes and technology. A university that continuously harnesses digital technologies to create new sources of value for the community, will help increase flexibility to achieve its operational excellence. Here are some digital transformation solutions that have been studied in the past:

The authors (Azarov and Shaposhnikov 2022) presented a digital transformation method to create a digital university, also known as University 4.0 It also outlines the main obstacles in creating a new education system, and the main tasks in building a digital university. In addition, new processes for the design, production, storage and transmission of educational information, as well as a modernization of the method of managing the educational process are

presented. Finally, there are solutions to integrate e-learning into the information systems and business architecture of the university based on organizational and functional structures, associated with rules, responsibilities, and processes. The author also explained the university's business procedures, services and infrastructure to enable the proper operation of University 4.0.

The authors (Alexander et al. 2021) studied and examined the university's digital transformation and management process based on analytical tools, arising problems when implementing the strategy of converting from classical form to intelligent form, identifying the university's digital transformation objects, including: university process, user interface, people, data. The author also showed that in a smart university the management decision making process should be based on big data.

The authors (Shindina et al. 2022) proposed a model as a basis for building a digital university, a tool to diagnose the current state of digitalization, identify strengths and prioritize digital development. This solution allows to evaluate business processes and digitize the working environment of students, teachers, administrative staff; digital university model, digital teaching methods, and shaping the student experience, research and development areas, campus and student life, administrative functions, functions of the teaching staff, university funding and management models, human resources, information and communications technology. In addition, the author highlighted the specific parameters for the conditions and results of digital transformation with the specification for the results in terms of digital parameters and socio-economic efficiency.

The authors (Sandhu 2018) pointed out the role of academic libraries in the digital transformation process at universities. Universities that are involved and leveraging the power of digital and doing centralized digital transformation can survive in the digital age. Libraries should act as a platform for digital transformation, digital education centers, digital learning centers that have revolutionized teaching and learning. Digital technology has changed the way research is conducted, and digital capabilities are a key factor driving the university's digital transformation through a competent digital workforce.

The authors (Villarreal et al. 2021) presented new challenges that have emerged in higher education related to the use and integration of new technologies propose factors to support the implementation of the digital transformation plan of the Panama University of Technology, including digital resources developed for professors and researchers, to share with students, has contributed to support the teaching-learning process.

The authors (Salykova, Ibadildin, and Borashova 2021) presented digital transformation at Astana IT University (AITU). The use of online courses, with the use of modern teaching methods, has enabled AITU to provide modern IT courses that are competitive in the economy.

The authors (Aditya et al. 2021) presented several barriers that negatively affect the implementation of digital transformation in higher education institutions specifically private universities in Indonesia. The proposed Barrier Diagnostic Framework (BDF) helps identify and prioritize barriers. Research has provided evidence of barriers to digital transformation in the higher education sector. A better understanding of high-priority barriers will help higher education management find effective strategies for managing resources.

The authors (Azarov and Chekmarev 2022) discussed proposals to build an optimal and adaptive new model for higher education, based on the concept of smart education or University 4.0. The author also presented the main tasks in creating a new digital university, new processes for designing, producing, systematizing, storing and distributing educational content, modernizing the way management and administration of the educational process.

3. Digital Transformation At Dong Thap University

Based on the main content of our national digital transformation project is “Strengthening the application of information technology and digital transformation in education and training from 2022 to 2025” (Vu 2022). Dong Thap University develops a digital transformation project at DThU focusing on two main tasks: i) developing infrastructure, facilities, equipment, and technology for education; ii) deploying a digital education ecosystem including a variety of software to serve students, lecturers, managers, businesses, and community links. The following content is the current status, general

paradigm, and implementation roadmap of digital transformation activities at DThU.

A. Analyze the current status

a) Network infrastructure and servers. DThU's telecommunications infrastructure was formed in 2022 and upgraded in 2009, allowing to connect buildings via fiber optic cables. Dong Thap University has 15 main fiber optic connection buildings: Head office building, A1, A7, A9, C1, C2, B1, B2, B3, B4, B5, B6, Library, H1, H2. The server room at DThU has 19 servers performing the tasks of DNS Server, DHCP Server, Database Server, File Server, Ubuntu Server, MLS software, digital library, the school's website and affiliates.

b) Computer rooms: The school has 12 computer labs totally, contributing to ensuring the quality of teaching services for nearly 4,772 students and approximately 500 non-formal students. Each year, the school enrolls over 1000 students, specifically 972 in 2019, 1,348 in 2020 and 2,169 in 2021.

c) Software for management and training: The developing process and application of information technology (IT) in education is associated with 3 phases: 1) Information technology application; 2) Digitization and 3) Digital Transformation. In the past two periods, Dong Thap University has equipped a number of training and management support software like Table 1.

Table 1: List of software status at Dong Thap University

TT	Software system names	Limitations
1	Boarding management	The software s ystems are not connected to each other to share the data, lack of necessary functions for users, outdated technology not suitable with the general technology orientation of the University, passive information transmission, lack of many modules on a mobile platform to support students.
2	Short-term training management	
3	Exam management	
4	Training management	
5	Online-courses management	
6	Administrative management	
7	Accounting and financial management	
8	Facilities Management	
9	Human Resource Management	
10	School Website, Department Websites	

d) Discussion: After nearly 20 years of construction and development (2003 - 2022), despite the regularly upgraded DThU infrastructure, it still cannot meet the requirements of a transition period. Servers, transmission lines, and computer rooms have been utilized for a long time, hence, they also affect the research and training requisites of high-quality human resources in the current period. The software is invested in phases, lack of synchronization and data interoperability leads to difficulties in monitoring, data aggregation, and statistical reports. The technology used and many software are outdated, and not fit for expansion and upgrading to meet the requirements of modern. In addition, the software comes from different suppliers, it has been used for a long time, so most of the warranty period has expired, difficulties in updating and developing new features for each software. Therefore, a new model is needed to upgrade the hardware and software infrastructure for digital transformation at DThU. This content is presented in the next section.

B. General model for digital transformation at DThU

With the goal of promoting digital transformation in university administration, teaching-learning activities to improve training quality as well as keep up with educational development tendencies at home and abroad, Dong Thap University has established Design a general paradigm for digital transformation at DThU as shown in Figure 1, including:

i) Hardware infrastructure;

ii) Software system;

iii) Supporting policies;

iv) Technology foundation.

1) Software system

Software systems play a substantial role in contributing to digital transformation's success. The software is integrated with outstanding features that will bring back effective university administration and training activities. Its crucial requirement at DThU is to integrate the most utilized features for students; lecturers; managers; alumni along with businesses. The software must ensure interoperability and use modern technologies such as AI, big data, and information actively transmitted to related objects based on mobile platforms. The subsystems on the

system include:

a) Digital management: Including software to support leaders and managers; concentrate on inspecting, examining, making statistics, reporting, and monitoring activities of relevant individuals and units.

b) Digital training: Including software to support teaching management activities, online training. Strong focus on digital transformation in online education towards serving learners and the essence of online training is to learn anytime and anywhere. Towards responding to open educational themes, including:

- Open about learning participants: There is no restriction on learners' age, professional qualifications, and social status as long as they have learning needs, especially learning to serve their careers. Or study for a career change

- Openness about learning locations: Online education has many forms including learning at home, at work, on technology apparatus..., that is, studying at any time and in different spaces, anywhere with an Internet-connected device.

c) Digital library: Strengthen the operational capacity of traditional libraries and form modern libraries; ensure the provision of 24/7 access to learning resources and plagiarism checking tools to satisfy readers' needed (officers, students, graduate students); provide library services to attract readers, contribute to improving the quality of training, support the accreditation of higher education institutions and training programs. Enhance academic along with online resources to meet training, scientific research, and community service requirements.

d) Testing and quality assurance: Designing software to support enrollment, testing, and education quality guaranteed. Prioritize the development of software to manage the exam bank, organize direct and online exams, prevent fraud when taking online exams, and manage training evidence.

e) Digital office: Designing software to support accounting, financial, administrative, and human resource activities, facilities, student work, scientific research, reports and statistics, assessment and ranking type of official. This system supports statistical functions, also reports related to students, lecturers, managers. Ensure all tasks are completed in the shortest time, instantaneously, and with accurate data.

f) Digital services: Including software to support public services for learners, officials, and off-campus partners related to training activities, including first-year student support services, healthcare, confirmation diplomas, certificates, collecting and handling requests from learners, introducing jobs to learners, provide human resources for enterprises.

g) Digital community: Designing software to connect DThU with the community in a digital environment to identify DThU brand on mobile platforms, a smooth and proactive bridge between DThU and the community (students, alumni, faculty, businesses, employers, educational institutions). The software allows to completely automate the recruitment process, survey users on all issues related to education; business needs. All inquiries regarding surveys, responses from students, alumni, and employers must be straightforward, quick, as well as accurate; information from DThU to all related subjects must be regular, continuous, and smooth.

2) Hardware infrastructure

The new software system at DThU supports integration, concurrent processing, big data storage, and is responsive to substantial users, so it is essential to invest in corresponding hardware infrastructure. Therefore, the DThU digital education ecosystem needs modern investment, including Network infrastructure, servers, wireless devices, monitoring equipment, multimedia rooms, and computer rooms. All must be invested synchronously, according to a schedule suitable to the actual conditions at the University.

3) Supporting Policies

The school needs to issue policies, and legal corridors related to digital learning materials such as intellectual property, copyright; related to teaching-learning quality in the digital environment, policies related to information security, politics, ideology, and ethics of teachers, learners such as protection of personal information along with related regulations, related to the organization's conditions of teaching and learning in the digital environment, quality assurance, legality, and recognition of results when teaching and learning online.

4) Technology Platform

One of the equally important factors when implementing digital transformation is choosing a technology platform. The technology platform's suitability is a decisive factor in its system operability. Once unified, this system is easily integrated, interoperability factor between systems is enhanced, supporting university administration, teaching-learning activities, and scientific research at DThU. Following is the orientation's platform with the technology used when implementing a project:

a) Server: Every server system needs to be deployed synchronously and configured hardware under the software system requirement.

b) Network infrastructure: Synchronous network infrastructure, including transmission lines, switching devices, routers, and wifi transmitters.

c) Software: Operating on Windows, or Unix platforms, ensuring interoperability.

C. Roadmap for digital transformation at DThU

Digital transformation is a hard and complex process that requires time as well as effort to complete. Therefore, DThU determines digital transformation takes place in 2 phases, each phase will have different goals, phase 1 from 2022 to 2025; and phase 2 is a vision for 2030.

1) By 2025:

- Completing the investment project to upgrade hardware infrastructure in a modern direction, basically building an overall software system for university administration at DThU on digital platforms. Building a large, interconnected, and synchronous database between training modules, with openness to develop the system in the future.
- Complete a digital training project with at least 50% of the modules implemented in online teaching; 100% of training, fostering, transfer, and postgraduate programs are implemented in the

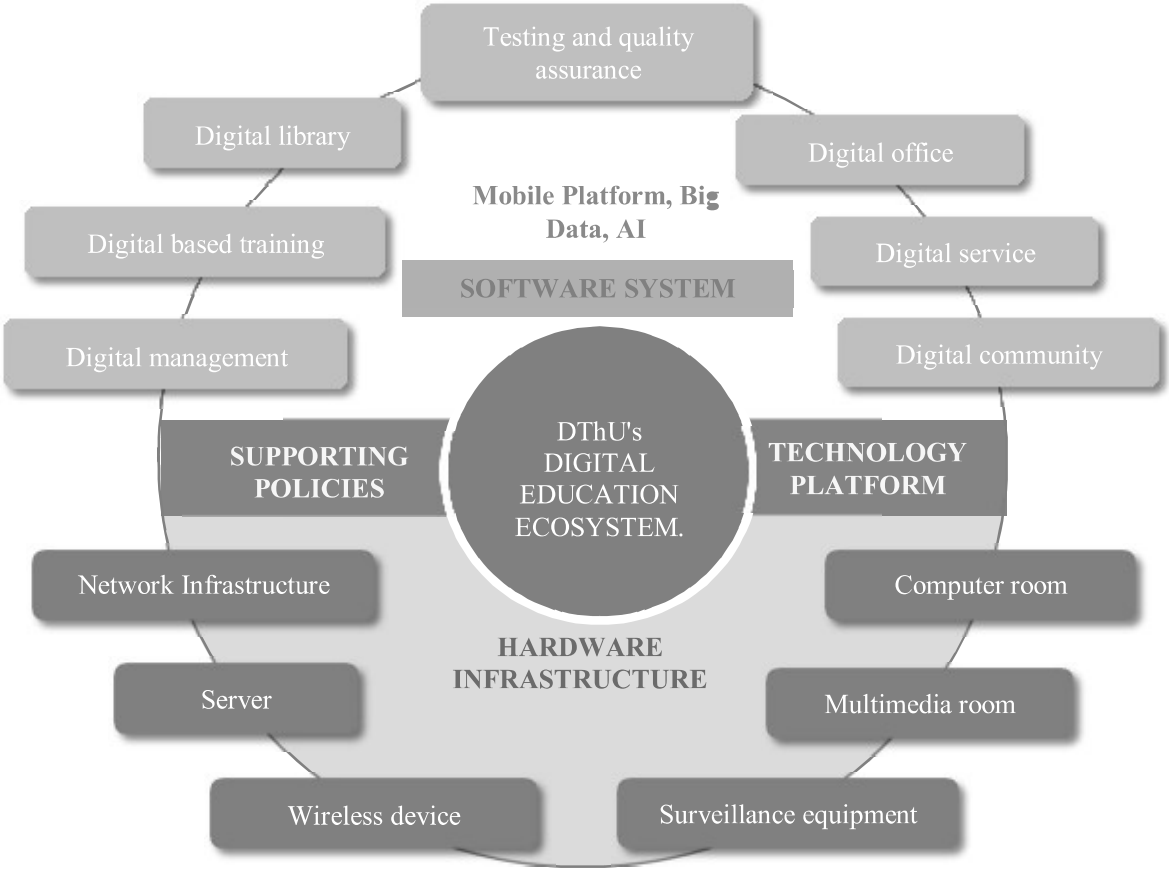

Fig. 1 : General model of digital transformation activities at DThU

form of a combination of online and face-to-face training. Promote in organize online exams and tests; building an anti-plagiarism system in evaluation activities.

- Accomplishing the digital library project, 100% of subjects with enough digital materials (lectures, textbooks, reference materials) are deployed on the university's digital library system. Conduct digitization of documents along with learning materials according to the course outline, share and exploit these learning resources on the digital environment as well as mobile devices.

- Completing digital university governance project with 80% of university governance activities converted to a digital-based governance model, including Management, administration, reporting, forecasting, and support making decisions, classify officials automatically.

- Completing digital administrative's project with 80% of work records at DThU processed in the digital environment (except for confidential files); 100% reporting mode, aggregating periodical reports throughout the school are connected, integrated, and shared data on the University's data system.

- Completing data integration project with 90% of the database are connected and shared for common software in the whole school; step by step link data to the Ministry of Education and Training or schools.

- To fully promulgate mechanisms and policies regarding administration, operating, and professional processes of units, lecturers, administrative officers, and students; 70% of staff and lecturers are trained in using tools and application software for digital transformation and management of DThU.

2) Vision to 2030:

- Digital transformation's level at DThU will reach an advanced level, meeting well the objectives, and requirements of innovation in education and training; Digital transformation has become a powerful driving force to improve the efficiency of administration, teaching-learning, testing, along with evaluation activities at DThU.

- Comprehensively innovating teaching-learning methods on digital platforms. DThU will have least 80% of the modules support interactive activities and online experiences; complete the development in open repositories for each training major, meeting 100% of learners' needs for learning materials.

- Administrative records will be arranged, organized, and stored in the database of online public service applications to ensure the ability to process, look up, make statistics, aggregate, connect, and share. with databases of related application systems, out of 80%, and over 95% of learners at DThU are satisfied with supportive quality services in the digital environment.

- Will perfect the university governance system, supporting University leaders to make decisions based on data, digital technology, and artificial intelligence; the operating and management system at DThU will be connected to the document system with the Ministry of Education and Training; 100% of professional activities with management agencies and partners will be carried out seamlessly in a digital environment.

4. Challenges And Solutions In Digital Transformation At Dthu

A. Challenges in digital transformation

For many higher education institutions, digital transformation is still pretty new and there is no specific strategy or plan. Here are some of the challenges preventing universities from achieving disruptive value from digital transformation:

- Difficult to manage change: Old working habits and ideas that are hard to modify will be a big barrier to a successful implementation of digital transformation. Therefore, it is requisite for each individual and unit at DThU to commit to altering, acknowledging the importance of adjusting processes and operations in good utilizing assistive technology, and focusing on every necessity of learners, of teachers.

- Old technology infrastructure: Digital transformation requires a commensurate technology infrastructure, also not every university is capable of doing this well. A software ecosystem with high complexity operating on old

and outdated technology infrastructure with poor security will not bring the expected results.

- Lack of potential: Digital transformation often faces barriers due to inadequate personnel and funding. To accomplish the goal of building a digital education ecosystem quickly and effectively, it needs collective consensus and especially an investment budget; once funding is limited, we are forced to focus on solving the current circumstance, instead of implementing the overall model uniformly and ensuring a more effectual future.

B. Solutions

To successfully implement the digital transformation project, the article presents various implementation solutions, focusing on three main groups: Raising awareness about digital transformation, increasing technology investment synchronously, reforming the organization, and implementation.

1) Increasing awareness about the digital transformation at DThU

- Strengthen propagation, raise awareness and responsibility, be transparent in thought, and be determined to join forces to implement digital transformation among all leaders, managers, officials, employees, and learners; Create a high consensus and unanimity among leaders, officials, lecturers, and learners at school; Overcome the old learning way of thinking, and a safety mindset, changing yourself to seize learning-training opportunities. Dynamic and creative in learning methods for, after all, technology is only a support tool, users who do not have a changing mindset cannot promote effectively.

- Change official's mindset, especially managers, improve the roles and responsibilities of unit leaders regarding the inevitable tendencies, benefits, and opportunities of digital transformation for the development of the unit; Including the task of digital transformation in an action plan for Faculty/Department/Center/Institute under and under the university.

- Each unit's leader is responsible to the Principal about digital transformation results at his/her unit; Align digital transformation goals and tasks with strategies, action plans, administrative missions, and training management. The unit's leader is committed to innovation, allowing testing and application of new technologies for development purposes.

2) Uplift investment in technology synchronously

- Technology is an extremely crucial factor when issuing a digital transformation scheme, though it can be tough to know exactly, it is necessary to identify technologies that align with the vision and goals of digital transformation. It is recommended that all individuals involved in the project view technology as a strategic enabler, not just an operational means.

- Equipment infrastructure is usually only invested when obvious limitations are revealed, and the investment purpose is to deal with these restrictions. This is worrisome, as adequate IT infrastructure deployment is critical for digital transformation and requires a long-term vision. Seek funding projects through domestic and foreign sponsorship programs to upgrade IT infrastructure. In particular, it is necessary to research technology solutions and synchronous investments from infrastructure to digital platforms, software, and support services to ensure compatibility in the future.

- Strengthening extra-curricular thematic reports, and helping officials, students effectively use new tools is one of the most crucial things in digital transformation. When applying any new technology, whether it is utilized by students or officials, it is necessary to accompany a learning path to benefit.

3) Renovating the work of organization and implementation

- Forming organizations and helping groups, assigning tasks to develop and deploy projects suitable for each unit to meet the requirements of digital transformation.

- Develop a clear, transparent digital transformation implementation roadmap, in which mechanisms and policies are developed to encourage and motivate units as well as individuals to participate in executing the project. Allocate appropriate funding sources to inspire them to join in the

project implementation.

- Advance a mechanism to encourage, motivate and create favorable conditions for units, and individuals to participate in piloting and pioneering the digital transformation process of the school.

- Re-established Information Technology Faculty named Faculty of Digital Technology to gather the strength of the staff of the two branches of Information Technology, Electronics, and Telecommunications. Effectively use current human resources by combining the strength of interdisciplinary scientists, oriented applied research for the development of units, and execution for the locality.

4) Training the leaders about digital transformation and its benefits.

- Training and training to raise awareness and improve professional skills for leaders of units, officials, civil servants and public employees to meet the requirements of digital transformation.

- Appointing staff in charge of information technology to participate in intensive training on techniques, digital technology, network safety.

5. Conclusion

In the article, we presented an overview of digital transformation in education at DThU. Propose a digital transformation paradigm at DThU, solutions, and a roadmap for digital transformation at DThU to improve training efficiency, towards improving teaching productivity in Vietnam along with other countries in the region. DThU digital education model aims to serve the following subjects: students; lecturers; managers; alumni and businesses, including:

- Students: Develop platforms to support students in learning and self-study by digitizing documents and textbooks; build a platform to share teaching-learning resources in both face-to-face and online forms; evolve a public service system along with an employment support system. Evolve applications in managing the Union - Association including a management system for social work days, conducting an assessment, and managing internal and external students.

- Lecturers: Strongly develop network infrastructure and equipment for training along with scientific research; system to support teaching, testing, and assessment activities; transforming the whole way in organizing, teaching methods, classroom management techniques, and interactive activities with learners into digital space.

- Managers: Creating integrated information systems, deploying high-tech integrated software, capable of making forecasts, consulting, and statistics to serve management, administration, and decision-making by leaders as well as managers. Deploying tools to support enrollment management, consulting activities, plagiarism checking tools, reporting information systems, work performance evaluation systems, digital administrative systems, and digital training.

- Alumni and businesses: Implement systems on mobile platforms to support the link between the University, businesses (including high schools), and alumni, ensuring information is transparent, often frequently, and quickly. Set up an information system to manage alumni employment surveys, enterprise recruitment needs, and recording feedback from enterprises on training activities.

A survey result showed that more than 98% of lecturers and 95% of students were satisfied with the project. This research result will be the foundation for digital transformation activities at DThU and contribute to improving the effectiveness of training at DThU even when natural disasters occur in the future.

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