# BUILDING A FLEXIBLE PROCESS IN TRAINING SOFTWARE TO MEET THE DIGITAL TRANSFORMATION REQUIREMENTS OF CURRENT UNIVERSITIES

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***Abstract:*** *Digital transformation is not only about the use of technology and data, but it also encompasses the restructuring of operational processes, changes in mindset, and organizational culture to optimize efficiency and productivity. Particularly in the context of higher education, digital transformation goes beyond digitizing documents and teaching activities; it involves a comprehensive shift in governance, management, and learning models. This requires the integration of digital technology into all aspects of the university to enhance the student learning experience, improve the quality of research and teaching, and optimize the university's management operations. To achieve this goal, building a university governance system that meets the requirements of a digital university is both essential and critical. This paper provides an overview of digital transformation in universities, analyzes the software requirements for meeting digital transformation demands in education, and establishes flexible processes in educational software. Within the scope of the research, the authors illustrate the development of a flexible course registration process.*

***Keywords****: Digital transformation, training software, course registration module, flexible process, digital university.*

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## 1. INTRODUCTION

On June 3, 2020, the Prime Minister signed Decision No. 749/QD-TTg approving the "National Digital Transformation Program to 2025, with a vision to 2030". This program sets out an important viewpoint on "digital transformation first of all is the transformation of awareness" and the central position of people in the digital transformation process. In the program's content, the education sector is considered the second priority sector after the healthcare sector. The goal is to develop a platform to support remote teaching and learning, thoroughly apply digital technology, digitize documents and textbooks, and build a platform to share teaching and learning resources in both direct and online forms.[1]

Higher education, in the context of digital transformation, has undergone comprehensive, rapid, and profound changes related to teaching models, ways of organizing and managing the learning process [2]. Training management has become one of the most important tasks in higher education,

requiring innovation and efficiency to meet the development requirements of society in the digital transformation era.

Closely combining theory and practice, using a series of scientific research methods such as analysis and synthesis, systematization, and generalization of theory based on appropriate document research, the group of authors proposes a number of basic requirements for building a training management system to improve the effectiveness of innovation in higher education in the current era of digital transformation.

## 2. CONTENT

### 2.1. Overview of digital transformation

According to Swen and Reinhard (2021), digital transformation is the process of changing a business by using digital technology [3]. Businesses not only convert data into digital form for storage, processing and calculation, but digital transformation helps to fully exploit the features of new technologies such as AI, IoT, Big Data to analyze, diagnose, transform data and create other economic values for businesses. Digital transformation is the process of people changing the way they live, work and work with digital technology, applying digital technology to all fields to change the leadership method, organization and operation of the unit.

Digital transformation in education is the activity of the education sector applying modern Information Technology (IT) to the learning and teaching of lecturers and students to meet the increasing learning needs, thereby creating a sustainable learning environment based on a modern technology platform, creating a learning environment where everything is connected, creating a collaborative, interactive and personalized learning experience [4]. Digital transformation is not just about digitizing lectures, or applying software to automate educational management activities, but is the transformation of the entire university from educational management methods, teaching methods, and ways of managing learners to a digital university model that exploits IT applications in research and teaching activities. In essence, digital transformation does not change the core values or school model, but is the transformation of core activities through technology and digital platforms, while enhancing the competitive position with other educational institutions in the world. Digital transformation is the intersection of technology and training strategy. To successfully transform digitally, schools need to apply a variety of solutions synchronously and comprehensively, from changing perceptions, digitizing teaching activities, creating a digital learning environment, digital learning materials and computerizing all school management activities.

Thanks to digital transformation in education, learners only need a smart device such as a phone, tablet or laptop to access a variety of content at school, at home or anywhere. For lecturers, digital transformation allows them to take their lectures beyond the classroom, across geographical and cultural boundaries, and potentially reach many learners around the world. Thus, digital transformation in higher education is not only a matter of innovation and technology application, but also a matter of culture and people. Thanks to that, both lecturers and students can improve their skills, with the common goal of creating a more engaging and effective educational process. The goal of digital transformation in higher education is to continue to provide human-centered services (teachers and learners) through new ways of working in the face of technological change, changing human needs and behaviors towards education [5].

Digital transformation is applied in universities to facilitate the learning process related to the ability to overcome various challenges, such as time and capacity in traditional learning. Digital transformation applies digital platforms to gradually convert direct training to online training. The

IT infrastructure invested by the school serves as hardware and network systems connected to the Internet, combined with digital transformation support services such as online teaching software, student management software, and grade management software deployed synchronously, bringing certain effects in teaching and learning of the school. Reis et al. (2018) assert that innovation in digital teaching is not only technical innovation but also innovation in academics, programs, organizations and structures that contribute to improving higher education teaching, transforming the existing physical learning environment and creating virtual learning environments.

Currently, digital transformation in the education sector plays a particularly important role in shortening the innovation process, improving the quality of education, especially in remote areas, and actively contributing to the national digital transformation process. In particular, in the context of global education integration as it is today, the education sector must pay more attention to applying technology platforms to maintain teaching quality and improve competitiveness with universities nationwide.

## 2.2. Requirements of the training management system

In the university management system, training management is an important module, taking on most of the functions for managing teaching and learning activities. Digital transformation in university management cannot be without building a training management system. Based on professional requirements and in line with the trend of the times, we propose the following requirements:

### *2.2.1. General system requirements*

2.2.1.1. About the user interface

The system runs on the web, and displays well on mobile devices (responsive) and web browsers, using Unicode character encoding. Install some applications that are used by many people with high frequency on mobile devices using popular operating systems such as iOS and Android.

User-friendly interface. Limit user interaction to internal symbols such as entity keys. Data can be updated via forms or imported from spreadsheets. Reports can be printed directly in the web application and exported to Word, Excel or PDF files. User interaction is minimized by maximum automation. Use context-based default selections.

2.2.1.2. About system administration

Users log in only once for all applications. Store and support access tracking, use of system functions over time. Authorized to perform and only perform system functions corresponding to the user's rights and responsibilities.

Users can interact and only interact with data that is appropriate to their rights and responsibilities. System interaction rights (access to functions and data) change over time, according to the rights and responsibilities of the user. Allows customization of specific functions with corresponding data for each user group according to the school's requirements when needed.

2.2.1.3. About the database

The server system is installed to ensure high availability, minimizing the possibility of system interruption. The stored data must be intact to ensure the consistency of the system according to the principle of "each event is stored in only one place". The system is open, has a customization mechanism that allows the addition of new features or modifications when there are changes in policies and operations.

***2.2.2. Requirements for system business processes***

Manage the planned teaching, learning plan (referred to as the training plan) and the implemented training plan based on the training program and enrollment results. Manage the courses according to the training plan.

Manage lecturers' planned hours based on their training plans and registration for other professional activities through departments. Link data with the workload management and overtime payment functions of the financial management subsystem.

Support for building timetables based on training plans, planned hours and specific conditions of classrooms and lecture halls. Decentralize the arrangement of timetables according to subject management units. Display timetables in formats suitable for different user groups such as: managers, lecturers, administrators, inspectors - supervisors,...

Managing student registration for course modules, including retaking courses, advanced courses and grade improvement courses. It allows authorized personnel to add students to course modules based on the university's decisions.

Manage timetable and actual teaching sessions. Manage teaching schedule and course content according to timetable. Support calculating actual teaching hours and confirming completion of planned hours. Support tracking absences and make-up teaching.

Manage component scores and final scores according to training regulations according to the functions of related users.

Managing student academic performance serves as a basis for developing student self-study plans, performing the functions of academic advisors and reviewing student progress.

Manage survey activities in training activities. Allows creating surveys based on pre-existing templates, editing, updating surveys and sending surveys to survey subjects.

Unified management between methods, forms (regular, joint, short-term,...) and training levels (university, master's,...), different training subjects such as students, trainees changing training majors, stopping progress, reserving, continuing study, transferring schools, studying two programs, studying for a second degree, dropping out of school, forced to drop out of school,...

Manage students' learning process based on accumulated results, evaluate, convert and classify learning results according to training regulations.

Process academic results by year. Support progress review by semester, school year and graduation review by course. Issue academic warnings to students with academic results that are subject to warning.

Progress review results are responded directly to the student's account and related people such as academic advisors, faculty leaders, etc. Progress review is not allowed when a decision has been made to recognize the results, but must be updated with another transaction.

Processing and recognizing student learning outcomes consistently across different types of training and education programs within the university. Credit transfer is based on the university's decision regarding substitute courses.

**2.3. Building flexible processes in training software systems**

Training software is not only an administrative management tool but also a center for providing learning services, tracking progress, managing course content and supporting teachers in teaching. In particular, training management processes such as course registration, timetable management,

assessment and feedback on learning outcomes need to be designed to be flexible to suit the diversity and change of educational needs.

In today's higher education environment, learning and management needs are constantly changing across academic years, training programs and educational policies. Training software needs to be built with the ability to easily adapt and adjust processes without disrupting university operations.

In this article, the authors will focus on illustrating the course registration process. This is an important process that affects many subjects such as students, academic advisors, training departments and finance departments. During the implementation process, this process may be adjusted to suit each year or each student course. Therefore, it is necessary to design a training software system so that when the administrator reinstalls the system, it can respond to changes in the practical process.

***2.3.1. Description of the course registration process***

To build a flexible class registration process in the training software system, which can be easily changed according to practical needs by simply reconfiguring without having to rewrite the software, it is necessary to design according to the following general process:

It is important to carefully analyze the specific requirements of the system and identify factors that may change in the future. These factors may include the minimum and maximum number of credits that students are allowed to register for, prerequisites for certain courses, registration periods (start, end) and special registration periods (late registration, additional registration), limits on the number of students per course, the schedule (class days, class hours), the subjects that review student registration, etc.

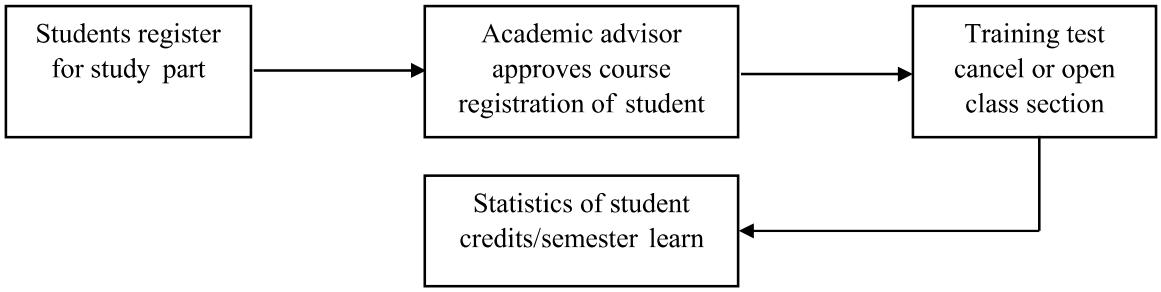
Modular and configurable system design means that the system is divided into several independent modules, and each module manages a separate part of the function. By dividing the system into modules, changes can be made easily by configuring the corresponding parameters in each module.

Building the administration and configuration interface, the system needs a simple, user-friendly administration interface. This interface will allow the administrator to make changes without requiring deep technical knowledge of programming. All these changes will be automatically applied by the system without editing the source code.

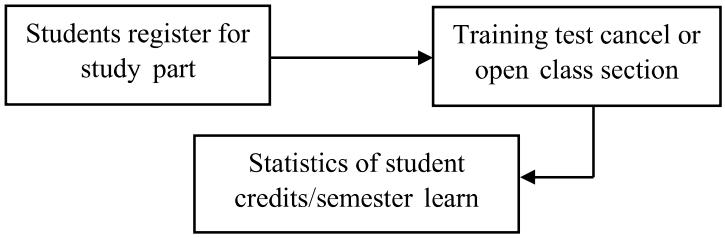
***2.3.2. Design and construction***

With the scope of the study, the authors illustrate the construction of a course registration process with a flexible process of changing the registration review object. The system configuration element is identified as the registration review object.

Process 1: Training creates a course, students register for the course, academic advisor approves the registration, training approves the registration to open or cancel the course.



Process 2: Similar to process 1 but remove the course registration approval of the academic advisor.




To build a flexible process like above, the author team designed and built the system as shown below.

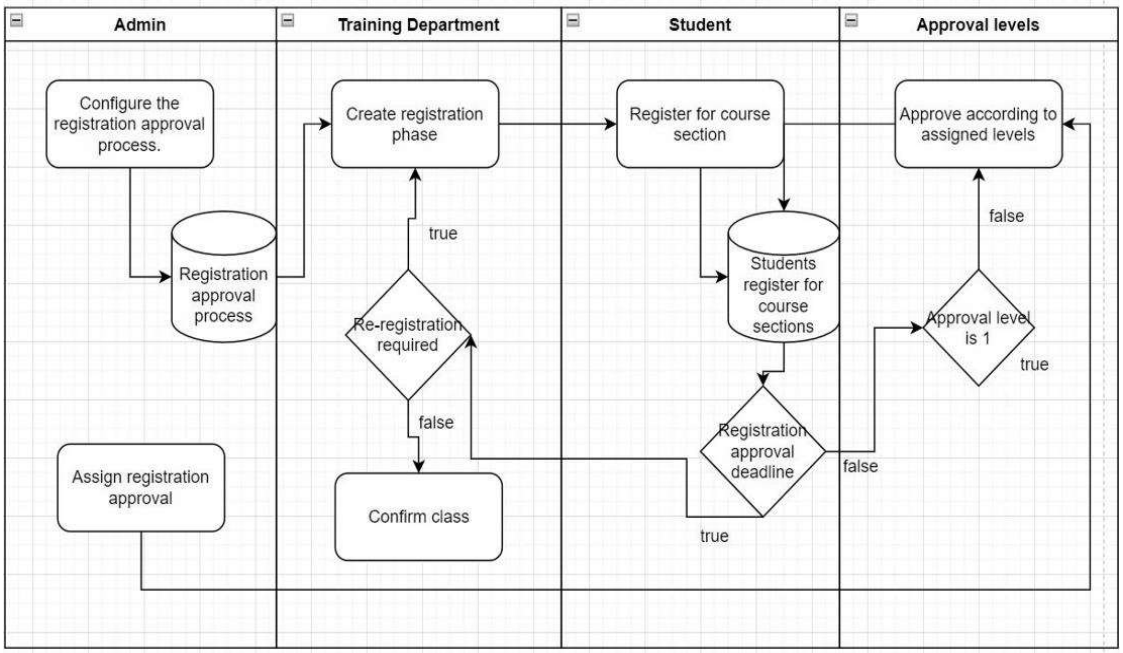



*Figure 1: Registration approval process*

With the configuration of the registration review object, the system can flexibly change the process depending on the practical requirements of the school as well as changes in policy. The administrator only needs to reconfigure the system, change a few parameters such as review assignment and change the review level without having to intervene in the program code.

## 3. CONCLUSION

In the context of today's digital transformation, building flexible processes is not only a requirement but also an opportunity to enhance the quality of education at Hanoi Metropolitan University. In the higher education environment, demands and conditions can change continuously, and flexible processes help universities easily adapt and quickly respond to these ongoing changes.

Universities with flexible processes will be better equipped to adapt to new trends and labor market demands, thereby enhancing their reputation and competitiveness in the education sector. Flexible processes allow for the optimal use of available resources, including human resources, time, and facilities. This helps reduce costs and improve the efficiency of training operations.

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## XÂY DỰNG QUY TRÌNH LINH HOẠT TRONG PHẦN MỀM ĐÀO TẠO ĐÁP ỨNG YÊU CẦU VỀ CHUYỂN ĐỔI SỐ CỦA CÁC TRƯỜNG ĐẠI HỌC HIỆN NAY

***Tóm tắt:*** *Chuyển đổi số không chỉ dừng lại ở việc sử dụng công nghệ và dữ liệu, mà nó còn bao hàm việc tái cấu trúc các quy trình hoạt động, thay đổi tư duy và văn hóa của các tổ chức để tối ưu hóa hiệu quả và năng suất. Đặc biệt trong bối cảnh giáo dục đại học, chuyển đổi số không chỉ là việc số hóa các tài liệu, hoạt động dạy học, mà còn là việc thay đổi toàn diện từ quản trị, quản lý, đến các mô hình học tập. Việc này đòi hỏi sự tích hợp công nghệ số vào tất cả các khía cạnh của trường đại học nhằm nâng cao trải nghiệm học tập của sinh viên, nâng cao chất lượng nghiên cứu và giảng dạy, cũng như tối ưu hóa hoạt động quản lý của nhà trường. Để thực hiện mục tiêu đó, việc xây dựng một hệ thống quản trị đại học đáp ứng được yêu cầu của trường đại học số là một yêu cầu tất yếu và quan trọng. Bài báo trình bày tổng quan về chuyển đổi số trong trường Đại học, phân tích yêu cầu của phần mềm đào tạo đáp ứng yêu cầu về chuyển đổi số và xây dựng quy trình linh hoạt trong phần mềm đào tạo. Với phạm vi nghiên cứu, nhóm tác giả minh họa việc xây dựng quy trình đăng ký lớp học phần một cách linh hoạt.*

***Từ khóa:*** *Chuyển đổi số, phần mềm đào tạo, module đăng ký học phần, quy trình linh hoạt, đại học số.*