Introducing the process of developing open education program for universities of information technology in Vietnam

Cao Thi Hao*, Nguyen Thi Bich, Nguyen Thi Hai Anh
Thai Nguyen University, Vietnam

corresponding author’s e-mail address: caohaokv@gmail.com

Abstract. The great achievements made in every field so far have given educators many challenges. In Vietnam, following the guidelines of fundamental and comprehensive education reform, the development of “open education” program is an urgent requirement contributing to the successful implementation of the education reform. The program will provide access to education for all people in need, regardless of age, education level, occupation, social status, gender, and can be implemented at all times and places. In the 4.0 era, the role of IT universities has been well defined. In order to maximize their role, they need to develop an open program. To establish and develop an open education program for Universities of Information Technology, the article proposes a process of eight steps. Step 1: analyzing context and assessing education needs (international context, national, and university context). Step 2: identifying six criteria and four objectives (knowledge, skills, ethics, capability) when developing open programs. Targets must be specific, detailed, easy to review and evaluate. Step 3: reviewing the current program, and designing new program contents. Step 4: selecting the form of training organization. Step 5: organizing examinations and accreditation of education quality, ensuring accuracy, objectivity, seriousness and flexibility in accordance with the training methods, subjects and contents. Step 6: verifying the training programs. Step 7: implementing the program (including two steps: Pilot implementation, evaluation and adjustment; mass implementation applied throughout the university). Step 8: evaluating the program (after implementation, the university collects, analyzes, and processes data to determine the value of the program). With the above process, the open education program will enhance the quality of education, in line with the trend of higher education in the world today. By attaching training goals to real life, to the development of learners’ capacity, IT universities will affirm their “brand”, their advanced and active role in the digital era, and the globalization of education today.

1. Introduction
The great achievements made in every field have given educators many challenges. In line with the trend of popularization, marketization, diversification and globalization, Vietnam’s education is also changing from a knowledge-based to a capacity-based education. The outcomes of the new education must be capable of acting with the highest level of four competencies: professional competence, methodological competence, social competence, and individual competence corresponding to the four pillars of education identified by UNESCO: “learn to know, learn to do, learn to live together, and learn to be.” The Party and State of Vietnam have paid great attention to education and proposed the...
guideline: “Reform the education system in an open, flexible and interdisciplinary manner between different levels and modes of education; Standardize and modernize the education and training” (Central Resolution 8, Session XI). Hereby, the Party has set the important task of “renovating the program to develop the capacity and qualities of learners, as well as virtue, mind, body and manner; teaching people, knowledge and profession”[5]. Therefore, developing an open program is an urgent task to contribute to the success of education reform. In order to obtain achievements in education reform in Vietnam, aiming at quality development for information technology universities, we need to consider the process of developing an open educational program for these schools.

2. Content

2.1. The concept of open education

Open education is a concept that refers to one type of education or the nature of an education. In the world, the concept of “open curriculum” was initiated in the early 20th century and developed strongly in the seventies of this century. Open education, however, has made a real breakthrough in the last 10 years since when the MIT Institute published its “open” learning materials online. The general understanding of open education is “Education in which unnecessary barriers on the path to education are broken down. Learners have reasonable opportunities to succeed in an educational system that is diverse in learning scopes and meets different needs of learners” [1]. Thus, developing an open curriculum is a prerequisite of the flexible education system. (Because the open curriculum will link the components together such as program contents, methods, forms of training, time, teaching and learning space, subjects, educational environment, etc). This will provide access to education for those in need, regardless of age, education level, occupation, social status, sex at all times and places.

In the 4.0 era, the role of IT universities has been confirmed. In order to maximize their role, universities need to establish and develop an open curriculum. “Curriculum development is the whole process of developing an educational program for a certain period of time: from reviewing the need for innovation to undertaking basic research; from proposing directions for the innovation (objectives, contents, methods of teaching, testing and evaluation) to the implementation”[2]. Thus, open education creates conditions for “teachers, scientists, administrators, parents and students to access, use, exchange, comment, supplement and finalize the program better and better” [6]. Here, we mention the development of an open educational program for IT universities towards the formation and development of quality and capacity for learners. This is reflected in the design, compilation, modification and adjustment of the curriculum in order to renovate and improve the quality of the program, in line with the context and educational needs of the country and the world.

2.2. Following process

To build and develop an open program, IT universities can follow the following process:

2.2.1. Step 1: Context analysis, educational needs assessment. Step 1: Context analysis, educational needs assessment. First of all, it is necessary to analyze the international context. Today, the Industrial Revolution 4.0 has been creating not only new opportunities but also many challenges faced for mankind. With the “unprecedented breakthrough” and “exponential rather than linear speed progress” (Klaus Schwab, Executive Chairman of the World Economic Forum), it is breaking down most industries in every country, including Vietnam. It can be said that the magnitude of these changes has signaled the transformation of the entire production, management and administration system. The Deputy Prime Minister Vu Duc Dam (at the High-Level Policy Dialogue on Human Resource Development in the Digital Age within the framework of the Second APEC Senior Officials Meeting in Hanoi) said: “The Fourth Industrial Revolution and the digital age not only help increase productivity, economic growth but also open up a human-to-human connection”. As a result, it is imperative to learn about the international experience of developing open educational programs at IT universities in developed countries in the region and around the world. When studying international
experience, curriculum development projects we should focus on such issues as higher education regulations, common points in the education system of the IT universities, the cycle of innovation, the goal of higher education, the structure of the program, the program implementation process and the cost of higher education. When studying the domestic curricula, the research team needs to explore the pros and cons in the current curricula of the same field in terms of theoretical and practical basis; then, studying the orientation of education reform, the point of view in developing the open program and other fields of education and training. Based on this, each university will develop an open educational program that is consistent with the conditions and characteristics of their establishments.

Next, the program development team needs to analyze the narrow context - the context of the university - to develop the program accordingly. The research team needs to collect general information about:

- The needs for socio-economic development, geographical characteristics, population and cultural identity of the area where the university is located.
- The educational management viewpoint of the university: What specific training goals does the university have to meet the educational needs of the country and the region?
- Conditions and facilities of universities: State funding sources, their own revenues, sources of funding for the curriculum development, infrastructure (classrooms, teaching facilities, other conditions for teaching and learning activities ...).
- Staff involved in teaching, management and scientific research: Do survey and provide specific data on the number of lecturers involved in the program: male/female; minority/religion; qualification; age; job skills; years of experience; achievements. The following sample can be used:

| No. | Full name | Age | Gender | Minority/religion | Qualification/major | Years of experience | research and teaching results |
|-----|-----------|-----|--------|------------------|---------------------|---------------------|-------------------------------|
| 1   |           |     |        |                  |                     |                     |                               |
| 2   |           |     |        |                  |                     |                     |                               |

- Students / trainees: The educators conduct surveys and give specific figures on the number of students / trainees; minority/religion; age; hobby; career orientation; achievements; then, generalize the characteristics of learners. The following sample can be used:

| No. | Full name | Age | Gender | Minority/religion | Career orientation | Major | Learning results |
|-----|-----------|-----|--------|------------------|-------------------|-------|------------------|
| 1   |           |     |        |                  |                   |       |                  |
| 2   |           |     |        |                  |                   |       |                  |

- The rank of the university in the university system of the country, the region, and the world: Observe, collect opinions, and make statements about the role of the university in the development of the country.

For example, when researching and analyzing narrow context for the curriculum development of the Information and Communication Technology University - Thai Nguyen University - the research
team had to collected necessary data as basis. The University of Information and Communication Technology was established under Decision No. 468 / QD-TTg dated on 30th October 2011 of the Prime Minister. The mission of the university is “a human resources training center with undergraduate and postgraduate degrees; scientific research and technology transfer in the field of information and communication technology for the cause of industrialization and modernization of the country”. About the organizational structure, the university has: Board of Directors (Principal, 2 deputy principal); 10 functional departments; 6 faculty of specialization; 2 divisions; 8 centers/institutes. In addition, there are organizations of Party Committee, Labor Union, Youth Union, Student Association, Veterans Association. The school has a total area of 86,795 m2, 54 classrooms (33 lecture halls and 21 labs) with a total area of 10,044 m2. There are 681 sets of computers, of which 485 are for practice /traineeship; 196 sets for the office work, test data management.

The hostel has 11 three-storey buildings with a total of 168 rooms to accommodate 1,344 students. In addition, the school has a stadium for sports activities. The area of the library is over 1000m2; the library has a reading room with 500 seats. Total number of books: 1,455 with 20,893 copies. Digital documents: 4,862; 6,000 files of exogenous resource, with 29 collections. Number of electronic data visits: 279,000 / year. At present, the university has undergraduate 17 majors, 2 master’s degree majors and 1 doctoral degree major. About the staff (up to March 2016): the total number of full-time lecturers: 337, of which 23 lecturers (7.4%) have doctoral degree or above; 215 (71.2%) have master’s degree. On such basis, the open educational program of the university will be develop to be “open”, flexible, facilitating cross-vertical training, supporting learners of all ages at different times and places.

Context analysis to build an open curriculum is essential to ensure that the curriculum is feasible.

2.2.2. Step 2: Define the goals and objectives for the development of the open curriculum. First of all, it is necessary to define criteria to ensure that the training program is "open". In our opinion, the “open” education program of the IT University must ensure the following criteria:

Criterion 1: The university’s training program is developed according to current regulations promulgated by the Ministry of Education and Training; with reference to the training programs of prestigious universities in the country and in the world; with the participation of professional scientists, lecturers, managers, representatives of social-professional organizations, employers and graduates.

Criterion 2: The training program has clear and specific objectives, logical and systematic structure, meeting the knowledge and skills requirements of undergraduate training and flexibly responding to labor market needs.

Criterion 3: The regular training programs are designed according to prescribed regulations, ensuring the quality of training.

Criterion 4: The training program is periodically supplemented and adjusted on the basis of reference to international advanced programs, feedback from employers, graduates, organizations, other educational and social organizations in order to meet the demand for human resources for socioeconomic development of the locality, the country and the world.

Criterion 5: The training program is designed to ensure inter-linkage with other training levels and programs.

Criteria 6: The training program is periodically assessed and implemented quality improvement based on evaluation results.

On that basis, the curriculum development team needs to identify the following objectives:
- Knowledge: equipping learners with general education knowledge; basic knowledge of the sector; specialized knowledge;
- Skills: develop soft skills and career skills for learners to meet the diverse needs of jobs;
- Moral quality: the training program aims to promote the noble qualities: honesty, courage, self confidence, etc; be responsible, enthusiastic, serious in work; respect the law, actively participate in community activities to contribute to building strong community;
• Competencies: the program also aims to develop competencies for learners to meet their corresponding positions.

Therefore, it is necessary to base on the results of context analysis and the needs assessment of learners to determine the objectives of the curriculum development. Targets must be specific, detailed, easy to review and evaluate. In this section, educators need to identify common goals for the whole curriculum and the individual goals for each module.

2.2.3. Step 3: Review existing programs, and design new program content. When choosing and arranging contents, educators should consider such issues as the value, significance, and the suitability of those contents with the social reality. The selection of program content is often based on the basic criteria: Significance (content must be meaningful to the needs and interests of learners and the society); Utility (content must be really useful in the life of learners); Effectiveness (content must be accurate and timely); Appropriateness (content must be consistent with the level of cognitive and psychological development of learners); Feasibility (content must be appropriate with the actual context of the educational environment, socio-economic conditions of the country).

Thus, to design the content of the open educational program, first of all, it is necessary to thoroughly study the current training program. Thereby, the Universities of Information Technology shall develop a highly practical training program that meets the requirements of labor recruitment; open more disciplines and specializations to meet learners’ needs. The training program shall be designed to ensure deep profession, also have reasonable interlinking, increase the number of optional modules for all levels of students. The training program is developed in the direction of application, increasing the practice time, linking training at the university with training at enterprises; developing a number of high-quality programs, advanced training programs; applying some training programs of prestigious international universities so as to improve and upgrade their own programs towards the international trends. These universities also need to develop highly qualified degrees, increase the number of graduate students and postgraduates; develop vocational training certificates to serve training needs of the society.

2.2.4. Step 4: Training implementation. The Universities of Information Technology (IT) need to develop a modern, friendly management and training process to become an open training service that meets various levels (PhD, Master, Bachelor) inside and outside the universities. Establishments have decentralized management functions, clearly defined roles and responsibilities of functional departments, faculties and departments throughout the system. Universities should have a software system to manage the online training, decentralization from the management board to departments, sectors, divisions, lecturers, students and modern resource services system (library, warehouse data). Training institutions should prioritize investment in upgrading equipment for training in practice rooms; improving the organization of practical learning to ensure practical efficiency; enhancing business cooperation, allowing enterprises to combine the training of a number of modules in the optional modules, replacement modules, graduation thesis; assign professional units to actively implement the process of training and evaluating students, enhancing the activeness and creativeness in studying and research for learners.

In addition, the organization of teaching methods should be flexible according to the requirements of each module such as inside classes, outside classes (clubs, competitions, seminars, exchanges, etc); interactive classes (teachers and students exchange online via the internet); dynamic classes (enhance the practical content); friendly classes (highly emphasizes democracy in the teacher-student relationship), open classes (learning anytime, anywhere through computers, telephones, televisions), etc.

With such an orientation, the open educational program will help learners to actively explore, exploit and accumulate open learning resources; Form learners professional competence, methodological competence, social competence, individual competence to prove and assert themselves in life and work.

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2.2.5 Step 5: Organize examinations and accreditation on educational quality. The program aims at building a modern system of examination and evaluation to ensure accuracy, objectivity, seriousness and flexibility in accordance with the training methods, subjects and contents; establish evaluation centers in each university. Universities and training programs are accredited and meet the requirements of the Ministry of Education and Training; Standardize the stages of issuing, implementing documents, organizational structure, management process, facilities and human resources. To achieve this, each university needs to improve the evaluation methods suitable with the training programs, learners and reality. The quality assessment must be done right in the learning process, attaching importance to the dynamic and creative elements of learners; develop a modern evaluation technology system to increase efficiency, objectivity, comprehensiveness and accuracy; increase skill evaluation criteria rather than knowledge. The system of criteria and procedures for quality assurance should meet the objectives of modernization of each university.

2.2.6 Step 6: Program verification. Training programs for the development and adjustment should be assessed. The appraisal committee includes reputable scientists. They are experts from the Institute of Information Technology - Vietnam Academy of Science and Technology, Institute of Information Technology - Hanoi National University, Institute of Technology, Post and Telecommunications, Academy of Management Education. Employers and alumni, etc. The program appraisal focuses on key issues such as objectives, curriculum content, methods and forms of training, examinations and accreditation of education and facilities. Then, the minutes of the appraisal meetings are recorded. The minutes can be written as the figure 1.

Annually, the Information Technology Universities should conduct surveys on learners, graduates, employers and other stakeholders on training programs and training quality. Based on the analysis and evaluation of the survey results, universities shall adjust the content of the curriculum, content of the subjects to meet the needs of learners and social reality.

2.2.7 Step 7: Program implementation. After the verification, the program will be implemented in two steps: 1) Piloting, then checking, evaluating, adjusting; 2) large-scale application.

2.2.8 Step 8: Program assessment. After the implementation of the program, the university will collect, analyze and process data to determine program values (whether the program meets the educational objectives and the practical needs; the process of program implementation creates outcome that fit the goal or not; advantages and shortcomings of the program; the impact of the program on learners). Review the program as follows: 1) Preparation for the assessment (define the purpose and scope of the evaluation, select evaluators, the aspects to be evaluated); 2) Developing an evaluation plan (objectives, data to be collected, method and form of assessment, time); 3) Data collection (through various forms and methods such as observation, test, study and research products, feedback, etc); 4) Data analysis and processing (classification in multiple levels with clear criteria); 5) Verifying the results (confirm test results, compare with given objectives, comments and recommendations).
### MINUTES OF TRAINING PROGRAM VERIFICATION

At the ... day ... month ... year ... the university verification council ... has met

I / Composition of the Verification Council

1. ... 

2. ...

II. Verification contents

1. The university report summarizes the progress of the development of the open education program

2. Opinions of members on the program:
   - Objectives:
   - Contents:
   - Training organization:
   - Examinations and quality accreditation:
   - Infrastructure conditions:

3. Answers from the Council

4. The council opens separate discussion

5. Results of the evaluation by votes
   - Number of votes issued:
   - Number of votes collected:
   - Valid votes:
   - Invalid votes:
   - Number of votes required:
   - Number of failing votes:

6. Conclusion of the Council

   The meeting ended at: ... hours ... day ... month ... year ...

   Secretary of the Council          Presidents of the Council
   (sign and full name)              (sign and write full name)

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**Figure 1.** Ministry of education and training socialist republic of vietnam University.
3. Conclusion
In the current context of education reform, the development of open curriculum is essential for the university system in general and the universities of information technology in particular. Depending on the actual situation of each university, the program may be developed in accordance with different “open” levels. A dynamic, flexible program will improve the quality of education, consistent with the trend of higher education in the world today. By attaching the training objectives to life, to the development of learners’ competencies, IT Universities will affirm their “brand”, advanced and positive role in the digital age, and the trend of educational globalization. The open curriculum of IT universities creates learning opportunities for all people of all ages at any times and places, for information technology always offer the hidden challenges that raise aspiration and passion to all people.

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