Teaching Process for Modules in the Information Technology Major for Higher Students According to the Competency Approach

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ABSTRACT: The first part of the article studies the concept of "competency" and approaches to competency, setting goals and output standards of the teaching process. The main part of the article focuses on analyzing the teaching process according to the competency approach, introducing the program content of the Information Technology knowledge block. The content of this program includes basic information technology, programming, operating systems, networks, databases, software, information security, artificial intelligence, web and mobile development, and management. projects, and cloud computing.

The teaching process according to the competency approach is described in detail, starting from determining learning goals and output standards, followed by learning and practice. Using AI Chatbot and Website is recommended as an effective means of learning. Special emphasis is placed on student support through AI Chatbot, helping students to be autonomous and confident in the learning process. Diverse exercises and practices are provided to develop students' abilities.

Next is the testing and assessment step, emphasizing the importance of multi-dimensional assessment to ensure objectivity and fairness to test students' knowledge and abilities. The last part of the article is to perfect the teaching process based on the competency approach in the Information Technology industry, with benefits such as the competency to personalize learning and develop learning competency for students.

KEYWORDS: AI Chatbot, Competency Approach, Information Technology, Teaching Tools, Teaching Methods

INTRODUCTION

Technology 4.0 is developing strongly, and the need for highly specialized and flexible information technology human resources is increasing. To meet these challenges, the Information Technology teaching process needs to be innovated towards a competency approach.

The competency approach focuses on developing necessary competencies for learners, including knowledge, skills, attitudes, professional values, methodological competencies, social competencies and personality competencies. The competency approach has many advantages such as helping to comprehensively develop necessary competencies for learners, creating a positive and proactive learning environment and promoting learners' creativity and critical thinking.

To integrate the competency approach into the information technology teaching process, universities need to innovate in content, methods and teaching media. Regarding content, it is necessary to build a training program that focuses on the necessary competencies for Information Technology workers. Learning content needs to be updated regularly, closely following the development practices of the Information Technology industry. Regarding methods, it is necessary to use active teaching methods, encouraging learners to actively participate in the learning process. Regarding teaching media, it is necessary to use advanced technologies such as AI Chatbot and Websites to support the learning process of learners. Integrating the competency approach into the Information Technology teaching process will help students comprehensively develop the necessary competencies to meet the requirements of society and the labour market.

1. Teaching based on competency approach
1.1. Definition of competency, approach to competency

"Competency" (ability, aptitude, capcompetency, competence, skill in English) is a scientific term and there are many different views on this term. According to the Great Vietnamese Dictionary (2010), competency is defined as the competency to perform a certain job well, including professional competency and organizational competency.

Guofang Wan and Dianne M. Gut (2011) define competency as the integration and connection of external needs (requirements of the context and situation) with personal characteristics (knowledge, cognitive skills, practical skills, attitudes, emotions, values and ethics, motivation) to successfully perform tasks, in which: Knowledge and cognitive skills are human knowledge that learners acquire; Practical skills and life experiences are acquired by learners through life experiences; Attitude is excitement, positivity, willingness to accept challenges and limitations; Learning motivation includes improving education, exams, wishes of parents, friends...; Emotion is the love of science, literature, and art; Values are love for family and self, confidence, responsibility for life, actions...; Ethics is behavior in family and society. According to Nguyen Loc and colleagues (2015), these elements are placed in a context (personal, educational, community and scientific) and real-life situations to build specific tasks in activities.

Safety of Western Australia (2018), competency is defined as the competency to apply or use the relevant knowledge, skills and abilities required to successfully perform tasks or tasks in a defined work environment. Competencies are often used as the basis for skills standards that define the levels of knowledge, skills and abilities required for success in the workplace as well as potential measurement criteria to assess the attainment of competencies. Competency is a measure of both demonstrated skills and demonstrated knowledge. According to Nguyen Quang Uan (2001), competency is a combination of unique attributes of an individual that matches the specific requirements of a certain activity, to ensure the best results in that field of activity. Author Nguyen Trong Son (2019) believes that competency is understood as the integration of knowledge, skills, attitudes, emotions, moral values and motivation to perform and achieve good results. in practical activities.

Through studying the concepts of domestic and foreign authors, it can be understood that competency is the effective and comprehensive mobilization of knowledge, skills and attitudes to successfully perform a job in a given task certain context.

Competency approach is an approach that focuses on assessing and developing individuals' abilities and skills to be able to meet their tasks and responsibilities in the professional environment. The competency approach not only focuses on identifying specific skills and techniques but also focuses on aspects such as knowledge, experience, logical thinking, creativity, social interaction, and competency. problem solving competency. Emphasize a comprehensive consideration of each individual's abilities rather than focusing on just one specific aspect.

1.2 Teaching based on competency approach

There is no unified definition of the concept of teaching according to the competency approach, because authors define it from different contexts. There are many terms used to refer to teaching based on the competency approach. These terms include competency-based education, competency-based curriculum, standards-based education, and performance-based education, etc. Regardless of the context, teaching Competency approaches refer to instruction, assessment, grading, and reporting based on learners' acquisition of knowledge and skills required by the curriculum.

According to Savage (1993), teaching based on the competency approach is a teaching method that emphasizes life skills and assesses the mastery of skills necessary for individuals to function competently in a certain society. Mosha (2012) notes that the Competency Approach training program aims to develop in learners the competency to know, learn and learn how to learn, how to do, how to learn and work with others. Wood (2008) emphasizes that teaching based on the competency approach requires teaching and learning to be done on a learner-centred basis. Authors Nguyen Van Cuong and Bernd Meier (2010) with the topic "Some general issues about innovating teaching methods in high schools" focus on clarifying the advantages and disadvantages of content-oriented programs; output-oriented programs; and competency development-oriented programs. From there we conclude that to overcome the "academic and scholastic" situation of current educational programs, approaching an output-oriented and competency development-oriented educational program is the optimal choice. Teaching methods must both pay attention to active learners' intellectual activities and at the same time train problem-solving abilities related to life and professional situations, linking intellectual activities with physical activities. practice, practice.

Nguyen Minh Giam et al (2023) believe that: Teaching competency development is the process of organizing teaching to help learners exercise their psychology and physiology to improve their awareness, skills and learning attitude from their current level. to a new, higher level to achieve identified training goals. Author Nguyen Minh Giam and colleagues (2023) also developed measures to develop self-study competency for students using AI Chatbot in teaching chemistry to develop self-study competency in chemistry for high school students. basic education. Through these measures, teachers only guide and support students or students to research on their own to develop self-study competency, independent research skills, creative thinking skills, and the competency

to exploit and use information. Use information, skills to update new knowledge, and communication skills on computers with the support of AI Chatbot to develop self-study competency for students for each competency component. Le Thi Thanh Thuy et al (2020) believe that teaching activities follow the competency approach, which is output-oriented (results of assessing the learner's competency through training and learning) to ensure the quality of teaching output, realizing the goal of developing comprehensive education, focusing on the competency to apply knowledge to form and prepare learners with the competency to solve real-life situations. The elements and conditions of teaching activities according to the competency approach all focus on describing the quality of output, which can be considered the "final product" of teaching activities. The management of teaching quality shifts from controlling "input" to controlling "output", that is, the results of assessing learners' abilities.

From the above analysis, it can be understood that teaching according to the competency approach is a process in which, under the organization, guidance, and help of the teacher, learners are self-aware, positive, proactive, and creative. self-organize and self-control their cognitive and learning activities to develop necessary competencies for learners, through active teaching methods and strategies to effectively carry out teaching tasks. , thereby achieving the goals required by the training program, and meeting the requirements of life and career.

2. Teaching process for modules belonging to the specialized knowledge block of Information Technology according to the competency approach

2.1. Brief introduction to the program content of modules belonging to the specialized knowledge block of Information Technology.

The Information Technology sector plays an important role in every country in the world, including Vietnam. In modern social life, the role of the information technology industry is clearly shown in most areas of life, educational activities, healthcare, culture, business, management... This is considered is a solid foundation to serve the country's sustainable development process. This requires higher education institutions to constantly change, update goals, content, means and innovate training methods for the Information Technology industry.

The content of information technology training programs is often diverse and rich, but there are core contents that the programs basically focus on researching. Specifically: (1) Basics of Informatics: Introduction to the history and development of Information Technology, Basic concepts of computer systems, programming, data structures and algorithms...; (2) Programming: Research popular programming languages such as Java, Python, C++, C#, Develop skills to design and deploy applications,...; (3) Operating System and Network: Understand how operating systems operate and manage resources, Master knowledge of computer networks, including basic and advanced networks,...; (4) Database: Design and manage databases using database management systems such as MySQL, Oracle, MongoDB, SQL and database query languages,...; (5) Software and Application Development: Analyze requirements and design software, Use software development tools such as IDE (Integrated Development Environment),...; (6) Information security: System and data security, Security testing and security solutions,...; (7) Artificial Intelligence and Machine Learning: Basic understanding of artificial intelligence, machine learning and natural language processing,...; (8) Web and Mobile Development: Build web and mobile applications using technologies such as HTML, CSS, JavaScript, React, Angular, Flutter,..; (9) Project Management and Software Development: Project management and software development process, Using Agile and Scrum methods,...; (10) Cloud Computing: Understand cloud services such as AWS, Azure, Google Cloud, Deploy applications on cloud platforms,...

The content of information technology training programs is often flexible and continuously updated to respond to rapid changes in the field of information technology in the current era.

2.2. Teaching process for modules belonging to the specialized knowledge block of Information Technology according to the competency approach.

The teaching process for modules belonging to the specialized knowledge block of Information Technology according to the competency approach includes the following steps:
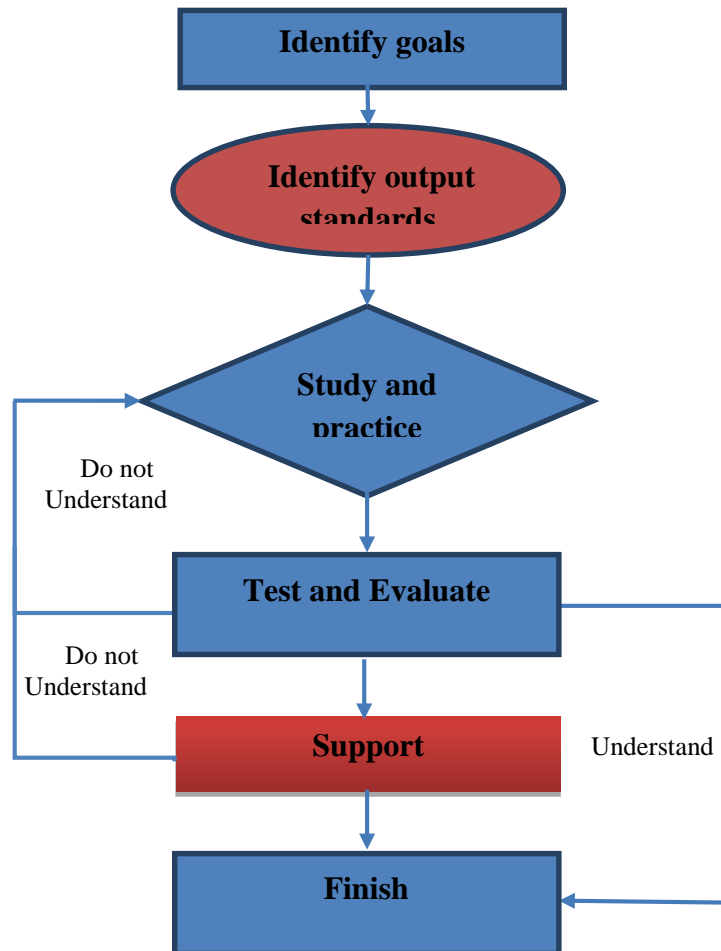
Figure 1. Teaching process for modules belonging to the specialized knowledge block of Information Technology according to the competency approach

Step 1. Identify goals

Teaching goals are divided into three main components: knowledge, skills and attitudes. The knowledge goal is to help students understand and master specialized knowledge. The skills objective is to help students develop the skills needed to perform work in the Information Technology sector. Attitude goals are to help students develop moral qualities, creative thinking and the competency to solve problems in life. The goal is to help students meet the output standards of the modules in the Information Technology knowledge block.

Step 2. Identify output standards

The first step in the teaching process according to the competency approach is to determine the learning outcomes of the course. Output standards are the competencies that students need to achieve after completing the course. Output standards are built based on the training objectives of the training program and the needs of the labor market. The training output standards in the Information Technology training program are established and expressed as what learners can do after the training process based on the prescribed minimum competency standards. Based on analysis of training programs and survey results of the current situation in the field of Information Technology.

Step 3. Study and practice

With the characteristics of teaching specialized Information Technology subjects, it is necessary to choose appropriate learning media and methods for learners to maximize their learning competency to quickly achieve teaching goals. best.

The method chosen is a combination of active, learner-centered learning methods that help learners proactively participate in learning activities and develop their abilities. thinking, creativity, problem solving, cooperation,... and from there develop necessary capabilities such as: Teaching to discover and solve problems, Project-based teaching, Differentiated teaching, Teaching based on case studies, WebQuest teaching method...

Learning media: Currently, there are many media to serve effective learning and practice activities in Information Technology training. In the framework of the article, we choose AI Chatbot combined with Website in the process of teaching some modules of information technology to teach theoretical modules. With the specific exploitation process as follows:

- Students log in to the AI Chatbot combined with the website to study the modules that the teacher has previously scripted.

- Learn theory with the support of AI Chatbot, to provide theoretical content, definitions, images... and answer students' questions related to the module content...; The website provides text lectures or video lessons for students to study. After students finish learning the theoretical content, they will proceed with the lessons they have learned through text and image questions or through videos to help students grasp the operations to practice... AI Chatbot provides instant feedback. and support students in solving questions and difficulties during the learning process. This helps students feel cared for and supported, thereby increasing their motivation to learn. In addition, AI Chatbot can be used to personalize learning, tailored to the needs and abilities of each student. This helps students develop their abilities more comprehensively and effectively. AI Chatbots and websites can provide rich and diverse learning resources, helping students learn effectively on their own. These resources include video lectures, lectures, exercises, cases, etc. Students can self-study at their desired time and place, suitable to their own needs and abilities. This helps students develop the competency to be autonomous and self-study, thereby becoming more confident in the learning and working process.

- Practice learning modules in the specialized knowledge block of Information Technology according to the competency approach with the support of AI Chatbot and website in the following ways:

+ Provide diverse exercises and practice situations: AI Chatbot and website can provide diverse exercises and practice situations, suitable for different learning levels. These exercises and situations can be designed to develop students' professional competencies and soft skills.

+ Guide students to practice: AI Chatbot can guide students to practice through examples and specific instructions. This helps students master the necessary knowledge and skills.

+ Studying helps students have the necessary knowledge and skills to practice. When studying, students are exposed to new knowledge and skills according to the competency approach. These knowledge and skills will be the foundation for students when practicing. Practice helps people consolidate knowledge, skills, and develop necessary abilities. When practicing, students can apply the knowledge and skills they have learned into practice.

The practice process helps students gain a deeper understanding of knowledge and skills, and at the same time develop necessary competencies such as: competency to manage, exploit and use information technology media; competency to create and apply Information Technology in the process of fulfilling professional requirements; Digital competency;…

Step 4. Test and Evaluate

Assessment is an important activity to test and evaluate student learning outcomes and adjust the teaching process. Assessment needs to be carried out according to the learning outcomes of the course and ensure objectivity and fairness. The assessment process helps collect data to identify learners' strengths and weaknesses, thereby reviewing and adjusting to improve the effectiveness of the teaching process. The scope of the assessment is wide, in addition to assessing knowledge acquisition, we must also assess many aspects that have both an adjustment effect and educational significance in teaching such as Learning awareness, learning competency, responsibilities, experiences in the learning process, feelings, discipline.... Thereby helping teachers provide information for learners to self-reflect and continue their learning path to achieve competence.

Step 5: Support

In teaching, supporting learners is an important activity. Through support activities, we aim to help learners feel satisfied and happy so that they are motivated to complete their learning tasks well. With the application of AI Chatbot and Website in teaching Information Technology, when students need support, they will enter the key "support" or "cough" into the Chatbot, and the Bot will quickly answer questions. questions and requests, with the competency to support multiple learners at the same time.

In case there are questions that the Chatbot cannot support, they will be forwarded to a real teacher for support via direct connection to the teacher or sending a message on the system for the teacher to answer.

Step 6: Finish

When the learning process is over, students can return to the original steps to study and practice when necessary.

3. Conclusion

In the context that the Information Technology industry is increasingly developing and requires flexibility and creativity, applying the competency approach in the teaching process is becoming increasingly urgent. The article has presented a detailed teaching process, integrating means and competency approaches to optimize the development of knowledge and skills for Information Technology students.

The combination of AI Chatbot and Website not only helps students access information effectively but also promotes self-learning and creativity. Through this article, we hope that the teaching process based on the competency approach will provide important support for training excellent information technology experts in the future.

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