

TECHNOLOGY SOLUTIONS FOR PRACTICE TEACHING IN ONLINE TRAINING AT HANOI OPEN UNIVERSITY

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Abstract: *Along with the development of technology and the increasing demand for lifelong learning, online learning is an inevitable trend that countries around the world as well as Vietnam are aiming to and promoting, especially in the digital era. Online training offers many benefits and is accessible to learners. However, when implementing online training, along with difficulties to be solved such as investment in technology infrastructure, open learning resources, teaching staff, learner management, etc., the problem is how to organize the training of practice modules to ensure quality and effectiveness. This article addresses the requirements for practice teaching in universities, and at the same time outlines the current situation of practice teaching in general and online teaching in particular at Hanoi Open University, an educational institution pioneering in online training. From there, the article proposes one of the effective solutions, contributing to overcome this limitation, that is to design a virtual reality environment for practice teaching on the basis of identifying the components of the virtual reality environment with appropriate software to meet the requirements of scenarios, features and techniques according in each stage of practice teaching design.*

Keywords: *online training, practice teaching, virtual reality environment, long-life learning, technology methods.*

I. Introduction

Carrying out the mission of building an open education system, Hanoi Open University has organized distance learning for nearly 28 years since its establishment and implemented online training in 2008. Up to now, the distance training program in general and online training in particular

has gradually affirmed its position and quality in Vietnam's higher education system and contributed to building a learning society and lifelong learning. However, when implementing online training, along with difficulties to be solved such as investment in technology infrastructure, open learning resources, teaching staff, learner management, etc.,

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the problem is how to organize the training of practice modules to ensure quality and effectiveness.

Therefore, in order to convert practice teaching methods from face-to-face to online, it is necessary to research technological solutions and teaching techniques suitable to the characteristics and requirements of practice teaching, in order to create a practice environment on the school's online training system in the current period.

II. Theoretical background

2.1. The concept of practice and teaching practice

Practice is the way to apply theory to real life experiences, "Theory is abstract, difficult to understand, but practice is very clear and specific and helps us to better grasp the theory". In order to understand complex problems and actively solve problems arising in practice, it is necessary to have a good theoretical foundation. After mastering the theory and principles, learners need to practice a lot to accumulate experience and skills. There's knowledge that is never seen in theory, but can be formed only through a long time of accumulation and practice. Therefore, the general trend in training programs of application-oriented universities is to focus on practice.

Practice teaching is a teaching activity based on the observation of the lecturer as a model and the students performing under the guidance of the lecturer in order to complete the exercises and activities of the major, thereby applying the theory to form the necessary skills in the profession. At the same

time, teaching practice helps students consolidate professional knowledge, build competencies, qualities, behaviors and develop thinking to be able to handle situations in their major.

2.2. Organizing practice teaching activities in universities

The process of teaching practice together with the process of teaching theory and experiential activities outside of class time form a unified whole in the process of comprehensive training of human resources according to competency approach. The relative division of the university training program with theory modules and practice courses is based on training goals and outcomes that learners achieve after graduation. They are complemented, unified, changed and inherited from each other. Currently, application-oriented universities are tending to unify the process of teaching professional theory with the process of teaching practice (integrating theory with practice). Modular training and MES (Module Employable Skills) are being implemented between teaching theory and teaching practice in close association with each other. However, the difference in goals in methods of acquiring and perceiving theoretical knowledge and professional skills and techniques still exists objectively in the teaching process.

The teaching and practice process is geared towards the following objectives:

- Thoroughly grasp the educational principle "Theory goes hand in hand with practice" in human resources training for society.
- Help students raise awareness

about the role of education in the cause of industrialization and modernization of the country. Being aware of the individual's responsibilities and obligations in the development of society, thereby forming a sense and affection for the profession.

- Create conditions for students to apply theoretical knowledge in practice, thereby forming professional skills.

- The result of practice is one of the conditions to evaluate the ability and capacity of learners.

III. Evaluation of the implementation of practical teaching at Hanoi Open University

3.1. Overview of training programs and practical teaching methods at Hanoi Open University

Currently, Hanoi Open University has 22 majors/specialties. The training program of the University is built according to application orientation with the participation of lecturers, managers and representatives of stakeholders including organizations and individuals recruiting labor.

The training programs have clear and specific goals and are systematically designed, with linkages between levels of study, in accordance with the mission, educational goals and functions of the university, and at the same time towards the learning needs of learners, the human resource needs of the labor market. In particular, in addition to theory courses equipped with theoretical foundational knowledge of majors, the training program of Hanoi Open University focuses on practice courses that equip students with

practical skills needed to meet the defined output standards according to the job position.

The practice teaching process at Hanoi Open University is organized mainly by direct method in class or in practice rooms and experiments. The school is now equipped with practice rooms for the fields of Biotechnology, Electronic Information Technology and Tourism Management.

In addition, there are a few practice courses that have been taught on the school's online system. Whether in face-to-face training or online training, the practice modules fully implement the elements of the teaching process, including: Teaching objectives; Teaching content and program; Method; Teaching facilities; Teaching staff teaching practice and Testing and assessment activities. However, each module will be deployed in accordance with its own characteristics and requirements. Basically, in both training methods, the teaching objectives, teaching content and teaching staff are the same. The main difference of the online practice teaching method lies in the method, teaching medium and form of testing and assessment.

3.2. Organizing online practice teaching at Hanoi Open University

When implementing online training, all practice teaching activities are organized on an online platform with application software to manage learners and training activities. Learners use devices with network connection to access the online training system to participate in learning activities. The training content is deployed

mainly through electronic lectures posted on the learning management system (LMS), online learning sessions on the synchronous virtual classroom system (V-class) and class discussion forums to support learners (H113). Student learning is accomplished through:

- Study the content of electronic lectures:

Synthesize theory on practice processes; A step-by-step guide to the implementation process. All of the above content was recorded in the Practice room and put into electronic lectures with a combination of visual aids such as: illustrations, slides describing the steps in the implementation process, text standard description of each step in the process.

Electronic lectures are uploaded to the learning management system. Learners can access learning content from any location, at any time through smart electronic means with network connection such as computers, laptops, mobile devices. At the same time, they can review the lecture content an unlimited number of times.

- Join online learning sessions on a synchronous virtual classroom system

The online session is held twice during the course through online conferencing platforms such as: Big Big Bluetooth, Google Meet... During the lesson, lecturers and learners interact online with each other in real time. Therefore, in addition to sharing thematic content related to the course, online lessons are an opportunity for lecturers to answer learners' questions about the content of e-lessons and other problems

related to the subject.

- Exchange and discuss on the subject-class discussion forum

The subject-class discussion forum is open from the beginning to the end of the course. This is a place for learners, lecturers, and class administrators to answer questions, support and advise learners on any problems that arise in the learning process.

With this training method, learners can be proactive about their study time and place, but still have the support and advice of lecturers and class managers throughout the learning process. However, because the entire learning activity is organized on an online platform, students can only understand how to perform the practice processes without being able to practice these processes directly in a realistic space.

3.3. Some limitations in organizing practice teaching

For the face-to-face training method: The main difficulty is encountered when the course is deployed during the period of social distancing to prevent the Covid-19 epidemic and students cannot come to the lecture hall to study offline. Because the practice requires real space, utensils, tools and specialized equipment, the implementation faces many difficulties, affecting the plan and the quality of the module implementation.

For the online training method: Although the online training method brings many benefits to the learners, for the practice modules, this method also reveals many limitations. In particular, the

biggest limitation is not ensuring direct interaction between the lecturer and the learners during the practice so that the lecturer can “handle the work”, observe and edit the practical skills for the learners. Therefore, by implementing the practice course in this method, learners can grasp how to perform the skills/processes of the professions, but they do not have direct practice, so it is not guaranteed that they can implement precisely those procedures in accordance with the standards.

Therefore, in order to effectively deploy the practice module for both face-to-face and online methods, research is needed to come up with solutions to help maintain and promote the positive results achieved, at the same time, it is necessary to find technological solutions to overcome existing limitations.

IV. Proposing the application of virtual reality technology for practice teaching in online training at Hanoi Open University

4.1. Some modern technology solutions applied in teaching

Modern technology applied in teaching to promote the educational process is a requirement in the current digital transformation context. It can be fully understood as follows: Modern technology in teaching is about facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources. For practice modules, the conversion of practice teaching from traditional methods to digital form. The main difference lies in the way knowledge is transmitted through technological innovation to make

teaching more effective. Not all practice courses can apply modern technology due to the characteristics and requirements of that course, but modern technology can be applied to deploy the online practice course. Here are some specific solutions:

4.1.1. Solution to digitalize practice exercises in the form of videos

This is a simple, low-cost solution that only needs to be filmed once and created a special effect that can be announced and given to students for reference before practice. This solution contributes to reducing the burden of teachers in repeating the same content for different students. On the other hand, this lecture can pre-deliver each lesson to students on websites or other internet channels. However, this solution has the limitation that students will passively absorb only 1-dimensional knowledge without interacting with products, equipment, thus limiting their skills, so they will be confused when practicing ... The existing products are Video lectures according to the content of the lesson.

4.1.2. Solutions for applying Three-Dimension (3D) virtual reality technology

The application of 3D virtual reality technology helps to simulate real devices in the form of interactive virtual devices running on personal computers. This solution has a higher cost but creates more learning inspiration for students. That is, students get to interact with and view a lifelike 3D model of the device. The interactive integration by scenarios allows students to act like they are practicing on a real device, can observe in detail each device component and test operation etc.

This solution helps real practice shorter, operation on real devices more accurate, reduced damage, etc.

Virtual reality technology has really thrived in the past few years. Virtual reality, also known as virtual reality (it is virtual reality in English, abbreviated as VR), is a term describing a simulated environment that affects human senses, making people have realistic feeling (about 3D images, stereoscopic sounds, smells, mechanical impact on people through seats, wearable, mounted devices ...). The basic characteristic of a VR system is interactivity, three-dimensional, real-time graphics and the sensation of being viewed in a real environment are key characteristics.

4.1.3. Augmented reality solution

This solution is more advanced than the 3D virtual reality application solution, which allows interaction between teachers and students on a 3D application over the Internet. This solution helps lecturers observe students practice on virtual devices remotely via the Internet. Teachers and students do not need to go to class but can teach and learn on the 3D simulation system.

4.2. Proposing practice teaching in virtual reality at Hanoi Open University

With the development of information technology, we can completely apply the solution of building a virtual reality environment to teaching practice in online training. For some practice courses that are difficult to organize due to rare, expensive equipment or specific practice environments, especially in the context of epidemics and social distancing, it is now

completely possible to practice in a virtual reality environment, ensuring efficiency, safety and low cost. Therefore, in online training of Hanoi Open University, teaching practice in virtual reality is one of the effective solutions, ensuring a positive factor, solving the learning problem of learners, in line with the current trend of innovation in teaching methods.

4.2.1. Defining virtual reality environment

A general VR environment system consists of 5 components: software, hardware, networking, users and applications. In which, 3 main and most important components are hardware, applications, and software.

- Hardware and applications are usually equipped for the practice room (computers, projectors, sound systems, specialized technical equipment connected to computers, dynamic modeling systems, accessories included...).

- Software embodies the soul of VR, can exploit existing software programs into teaching. In fact, there is still a lot of specialized content that is not available in software for us to exploit. Therefore, the university designs and builds teaching software suitable for each specific professional content. In principle, any programming language or graphics software can be used to model and simulate VR objects. The development of software for VR systems needs to ensure the following basic principles and requirements:

- First, Shaping and simulation ensure accuracy, technicality, pedagogical visualization, and aesthetics.

Second, Simulation of kinematics, dynamics and simulation of the objectives' behavior.

Third, Compatibility on most computers running Windows operating systems. It should be open and flexible to easily adjust and supplement.

- The basic characteristics of the VR system need to be ensured with 3 characteristics:






+ Real-time interaction: that is, when people interact, put signals into the

computer, it will change the information shown on the communication screen.

+ Real feeling (immersion): the effect that creates the ability to focus the highest attention selectively on the information from the user of the virtual reality system. They will feel that they are part of the virtual world, mingling with that world.

+ Interaction: Environmental dynamics are rules about how people, things, and everything interact with each other in a certain order to exchange energy or information.

- Some software and tasks are used, namely:

Software name	Action
 Autodesk Maya	Modeling objects and characters Animate the character
 Adobe Photoshop	Draw textures for the model
 Substance Painter	Make textures, apply materials to the model
 Unity	Set up scenes and lighting in the app, set up interactions in the software
 Adobe XD	Application interface design

4.2.2. *Designing practice teaching in a virtual reality environment*

a) Stages of practice teaching design in virtual reality environment

* Stage 1: Prepare

- Determine the condition of the VR system in terms of hardware and software.

- Define practical learning content goals.

- Identify relevant knowledge and skills.

- Notes in practice, occupational safety...

- Build study sheets, test and evaluate...

* Stage 2: Building practical teaching activities

- Determine the content of the knowledge units that learners need to learn

- Divide each knowledge unit corresponding to a main activity in practical learning, in which there can be many component activities. It is expected for learners to participate in interactions and experiences in a virtual reality environment in a certain time. Requires a record of the causes and implications of success and failure in each activity.

- Learners discuss, evaluate, and learn from successes and failures at the end of experience process.

- Select a representative who has done well before to do a demonstration (demo) for the whole class

- Keep learners practising and developing skills.

* Stage 3: Test, evaluate and finish practice

- Build a table of assessment criteria provided to learners to guide learners to self-check and evaluate the results of themselves and their friends.

- The teacher plays the role of arbitrator, institutionalizing.

- At the end of the practice, the teacher assigns the homework to the learners to prepare and study in advance the practice content of the next lesson.

b) Design requirements for practice teaching in a virtual reality environment

* Script requirements

- The initial display screen includes the University and Faculty's Logo.

- The log-in screen includes ID/ Password and free log-in, then select the lesson, after completing the lesson, learners can choose other activities such as viewing grades, practicing again.

- Instructions to operate with VR devices.

- Practice exercises: Get shared utensils, get tools and equipment, fine-tune the tools (practice exercises in a certain period of time, students follow the steps and deduct points if they do it wrong or do not do it on time).

- Finish the practice.

- Simulate VR close to the real course: perspective in VR virtual space, interactively holding objects, moving like reality

- Instructional features (characters pointing, talking, guiding icons, text, etc.)

- Test feature: record the practice of students

- Features to view test results: statistics, show scores, show mistakes

* Requirements for images, graphics

- Simulate the practice room and real-life objects, the right size, proportions, materials ...

- Classrooms and equipment:

4.2.3. Organize and control practice teaching in a virtual reality environment

- Depending on the conditions of the virtual reality environment, the number of learners can be divided into small groups of 2 to 5 people per group to organize

practice activities.

- Applying a combination of active teaching methods, in which special attention is paid to experiential teaching methods.

David Kolb developed constructivist theory by proposing an “experiential learning” model to describe the learning process as a “learning cycle”. This is a form of learning associated with initial-preparation and feedback activities highlighting the individual learner’s experience. The steps of cyclic experiential learning are shown in the following diagram: [1, pp.54-57].



Diagram: Experiential learning model

This cycle requires learners to be active in their learning through planning, acting, reflecting, and linking back to theories.

The experiential teaching method is best implemented when students are organized to work independently and in combination with pairs/groups.

V. Conclusion

Online training is becoming more and more complete and effective when meeting a variety of learning needs. The strong application of

modern technology in education to design a virtual reality environment for practice teaching is one of the effective solutions, contributing to overcoming limitations in the organization of practice courses in online training today. It is necessary to develop digital content for practice teaching modules on the basis of identifying components of the virtual reality environment with appropriate software to meet the requirements of scenarios, features and techniques in each stage of practice teaching design.

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