

Lecturers and e-lecturers in cross-border education in the context of the fourth industrial revolution

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ABSTRACT

Nowadays, globalization has given birth to various forms of non-traditional education. These forms of education are transcending borders and traversing boundaries of space and time. The evolution of information technology in the context of Industry 4.0 has transformed education rapidly and, at the same time, resulted in new problems. This paper discusses the role, the importance and the relationship between lecturers (in universities) and e-lecturers (in the virtual reality environment) when implementing cross-border education. In addition, the article also mentions the changes of universities, lecturers, curriculums and teaching methods when deploying distance e-learning programs in Industry 4.0. The article uses conceptual models, diagrams and interdisciplinary methods such as education, culture, science and technology to investigate e-lecturers' concepts and provide solutions for improving the capacity of lecturers and the quality of teaching cross-border training programs in universities.

1. Context

When the world economy enters the fourth industrial revolution (Industry 4.0), the role of information technology and telecommunications in serving higher education also becomes more and more important. Great achievements in IT have made huge changes in higher education leading to upheavals of old-style universities into new ones. The universities are constantly transforming their content, programs, teaching, learning, exploring, researching and creating activities. IT achievements really provide a good context for the formation and development of distance education or "virtual university" and a global academic environment. IT development also contributes to connecting, disseminating and exchanging all the achievements between universities, research institutes, production facilities and businesses worldwide.

Globalization has brought about many non-traditional educational methods, which are beyond the boundaries of space, time and border. Information technology development in Industry 4.0 has quickly changed the face of education and thus, caused many new problems. Many new forms of trans-national and non-traditional education models such as virtual

education have emerged. They enable educators to provide more convenient education services to the public and enhance the higher education service market in a globalized world. Moreover, universities can also provide international learners with multiple cross-border curriculums through e-learning and other distance education facilities. Popular e-learning programs include Technology-Based Training (TBT), Computer-Based Training (CBT), Web-based training (WBT), Online training/learning, Distance learning, and so on.

2. E-lecturer and E-learning

Online education (e-learning) is a virtual learning method through a computer, a smartphone that is connected to the Internet via a server in another place. Electronic lectures and software should be available so that learners can access online lessons. Teachers (lecturers) can upload images and audio on the internet. Learners can log into virtual classes anytime, night or day, and almost from anywhere in the world. Once being online, they can choose to speak and practice with any other learner who is also on the system regardless of their class group, time zone or geographic location (Epignosis LLC, 2014).

Lecturers have the expertise competence to undertake the teaching and training at the university or college level, belonging to specialized training. When institutions deploy e-learning, the e-lecturer concept also appears as an extension or representation (digital virtualization) of traditional lecturers. Each type of e-learning needs an e-lecturer with proper functionalities.

An online classroom environment is supported by specialized video conferencing applications. Learners will be guided by one or more lecturers. However, a class does not always need a lecturer to supervise learners; in this kind of virtual classroom, learners can proceed at their own pace and instructors are only around to assess learners. Sometimes, there is no instructor at all. This type of virtual classroom is called an unsupervised virtual classroom with many ready-made learning materials that students can follow without teachers' help. E-lecturer in this virtual classroom model will act as a teacher to help learners with basic pre-programmed situations and AI that learns during e-learning operation. The second type of virtual classroom is supervised or guided class. This model resembles a traditional classroom. At least one active lecturer is present and lessons are taken at a specific time. Learners attend through video conferencing applications. In this virtual class, students and lecturers can interact in real time and actively participate in class. E-lecturer only replaced part of the instructor to help the lecturer and students (McLeod, 2006).

Advantages of e-lecturer

E-lecturer helps develop e-learning anytime, anywhere and impart knowledge on demand with quick feedback. Learners can access courses anywhere from offices to home or public Internet points 24/7. They can also meet the e-lecturer whenever they log into the virtual classroom (Valentina, 2014).

E-lecturer is more accessible. Learners do not need to wait until class time to ask questions; in a virtual classroom, they can easily communicate to solve any problems as soon as they are practicing. Virtual classrooms offer a built-in database and are organized like RPGs (Role-Playing Games).

E-lecturer helps university with more flexible e-learning deployment. Students are free to choose either courses with lecturers or self-interactive courses with an e-lecturer. They can choose a learning pace suitable to their abilities and improve their knowledge through supporting libraries and e-lecturer.

Disadvantages of e-lecturer

Some common problems such as emotional and spatial issues that create an impression for learners; direct interaction with learners is limited due to technical limitations. Students need an internet connection and networked devices to be able to learn. Any problem of the device or the transmission network can interrupt the learning process, not as vibrant as in a traditional classroom (Valentina, 2014).

3. The relationship between lecturers and E-lecturers in virtual reality environment

In terms of interactive interfaces (HCI), the e-lecturer is essentially a graphic representation of a lecturer in universities which consists of 2 parts: outer (appearance) and the inner part (including knowledge, skills and attitudes, emotions). The appearance is built on the basis of available character models of gender (male, female) and ages (middle-aged, senior) which students can choose (customized) to display in their course. The inner part is partly due to built-in knowledge (centralized data); partly due to the integration of information technologies with the actual context in the classroom (AI - artificial intelligence). Therefore, e-lecturer is essentially the interface of lecturers. The e-lecturer deployment is also the teaching of interactive AI that will help them become more intelligent to handle students' various complex tasks.

Technically, a virtual instructor (e-lecturer) is essentially the main character in a virtual classroom (like role-playing games). The primary relationship between e-lecturer and faculty is replacement and support: Replacement (a part): Representative of the lecturer; completely replacement: virtual lecturer. Created by the developer (educator). Entities in the database include personalities, characters... and students can choose their e-lecturers; Supported Replacement: lecturers cannot be available 24/7 so they will be replaced by e-lecturer when they are offline.

The following model is about the relationship between e-lecturers and lecturers:

Lecturers: provide the course content for the content development department based on the learning outcomes expected from the training management department. In addition, they will participate in interactions with students through the system.

Students: use user portal to study, exchange with lecturers and e-lecturers and use learning support tools.



Figure 1. Relationship between lecturer and e-lecturer.

4. Alternative e-lecture activities for lecturers

First, lecturers can chat directly with students. Using video lectures and hosting live conversations can be good ways to engage the learning community and make the learning process much more dynamic. A good virtual classroom will provide ways to interact with students. It is possible for the teacher to interactively play via video, audio system, e-lecturer or to chat directly based on the contents of the input text in the interactive screen, and thus, enhance the lecturer-student connection in the virtual classroom and students' learning experience (Holmstrom & Pitkanen, 2012).

Second, e-lecturer can foster interactions in learning activities. E-lecturer can be used as a teacher's assistant or a Help tool. E-lecturer will be more friendly and intuitive than the content displayed in the Help window. E-lecture can encourage students to participate actively in the learning process by asking questions and discussing.

Third, e-lecture can help combine instant feedback. Every student feels encouraged to explore with instant feedback on how well they do. This can be done in virtual classes by taking advantage of one of the most popular features of the learning management system: an automatic evaluation. These automated assessments will map to e-lecturer expressions and actions to help students identify the results of their activities in the virtual classroom.

5. Lecturers' changes

Lecturers participating in e-learning training must learn to adjust to these new changes both inside and outside the classroom. Inside the classroom, teachers need to learn how to interact with students through the system and how to integrate technology such as using computer programs, smartphones or smart Boards (McLeod, 2006). Outside the classroom, lecturers should learn how to navigate the virtual classroom web pages and how to compose e-lectures by multimedia or email them to students or parents.

Interaction in the classroom: Most virtual classroom sessions are based on the website 3D-VR and therefore, two-way interaction is done in real time. In a practical classroom,

teachers and students can participate in question-and-answer sessions. Debates as well as various forms of interactive learning tools such as role-playing can be conducted.

Currently, for some simple design virtual classes, users' access restricted data and pre-designed space, their data can be stored and managed. Therefore, the conceptual space of learners needs to be expanded infinitely and well-organized (Nguyen, 2018). The learner's emotions also fluctuate in relation to the extent of their conceptual space (Figure 2). Meanwhile, the universal world is in 3D, but most virtual classes today can only describe them in 2D (two dimensions). This makes the objects look unrealistic when viewed online. Therefore, the 3D virtual reality and interactive experience provide a more engaging experience. When experiencing something close to the way users experience it in the real world, their entire body becomes engaged (Nguyen, 2018). The physiological and psychological response to the VR experience has been ingrained in their memory for longer. VR and Interactive 3D are creative tools with great potential to attract attention and enhance learners' experience.

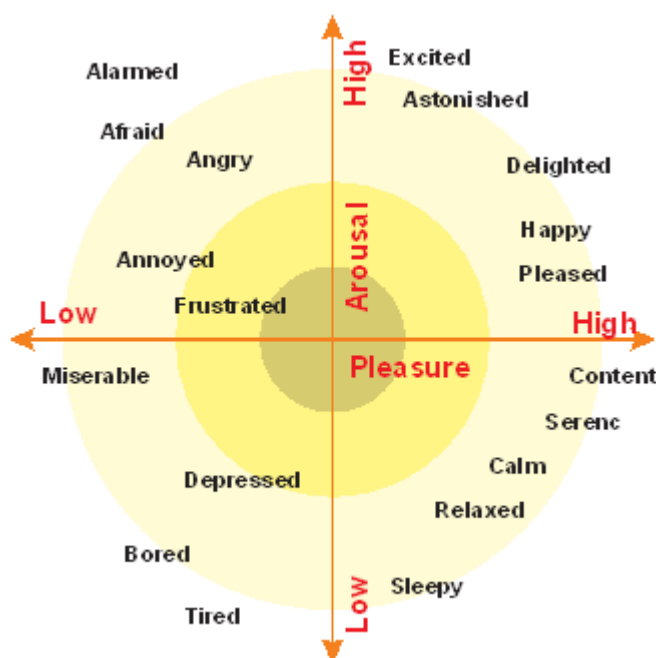


Figure 2. Learners' emotions and reactions are based on the dynamics of two aspects: the degree of excitement and level of provocation. They are related to the extent of the concept space (represented in the diagram with concentric circles).

Role playing is encouraged. In a traditional classroom course, teachers can write or draw on the board. However, in a virtual classroom, role-playing is another way to create awareness and interest in different issues. Accordingly, students are invited to participate in situations. The role is substituted for different subjects, to understand the nuances of each role - its needs and limitations. Another skill that is learned by effective role-playing is communication. Classes are divided into different groups, people communicate and talk on the basis of the subject matter. Therefore, through role-playing and discussion exchange, learners get more experience.

Various feedback forms such as audio feedback, iconic images, facial emotions and e-lecturer actions are used. Lecturers often have to familiarize themselves with the e-lecturer model to find effective contact emoticons and feedback tools are provided in the virtual

classroom. For example, teachers can use emoticons such as laughter and applause or symbols such as agree and disagree to relieve stress or encourage students.

6. Solutions for integrating e-lecturer into e-learning to improve interaction efficiency in virtual classrooms

First, about creating a virtual classroom environment with 3D-VR Web application

Website core 3D-VR consists of 3 main parts: static model rendering (Render), dynamic model (Animation) and artificial intelligence (Artificial Intelligence - AI). Web3D uses static models to build dynamic models and handle AI programming in the logic programming language. A special feature of Web3D-VR is the ability to provide users with real interaction with auditory and visual effects (hearing and seeing). Therefore, learners can feel and discover things without any difference in reality. 3D-VR Web can create 3D games, videos or other interactive elements such as models, real-time 3D animation, interactive simulations, and so on. OpenGL and Direct3D technologies will allow us to create vivid 3D images with high speed, good quality (full-HD) and beautiful visual effects (Epignosis LLC, 2014). When applied in real life, Web3D-VR technology not only creates simpler images but also helps users to interact online more easily than using the traditional 2D. The application of the photo section with 3D technology allows learners to interact with e-lecturer in more interesting and real ways. Moreover, in the virtual classroom, learners can rotate in many different angles (360 degrees in space) and can also move to different locations as if they were present in the captured space. Everything will be displayed in real 3D environments. Users can interact, rotate, and zoom in objects to view 3D on their display screen. All modes of interaction are combined and promoted with multimedia assistance in a virtual reality environment: letters, graphics, animations, movies, sounds, and so on. Therefore, learners' experiences are greatly improved.

Second, about improving learning content and create learning resources

In addition to creating a user-friendly interface with multimedia graphics systems and e-lecturer, virtual classroom needs new contents, a variety of practical subjects and disciplines to meet the required human resources training in accordance with the aspirations of learners and suitable to the domestic, regional and world labor markets. Besides, we can make the most of information technology power. Internet is now a huge repository of knowledge. Instead of just giving examples or case studies, course content and visual examples can be explored through the internet. Moreover, it is necessary to apply LCMS multi-user environment, where training institutions can create, store, reuse, manage and distribute learning content in a digital environment from a data warehouse center.

Third, about student statistics and tracking and learning assessment

Online reviews should be made regularly to ensure quality in distance education and accurately assess the capacity of learners. Besides, it is necessary to get feedback from learners to evaluate the training program and ensure that the courses are designed to meet customers' demands.

Fourth, about teaching and communication tools

It can be affirmed that English is an effective tool of cross-border higher education and has become the most popular language of higher education services. E-learning needs to integrate many tools to help learners communicate naturally and effectively in a virtual classroom. Englishization of teaching, learning and research increases the chances of expanding

the cross-border education market. In addition, culture is an important aspect of cross-border education. Intercultural communication needs to be more important in the training program and in cooperative activities.

Fifth, about improving the interactive environment in the virtual classroom

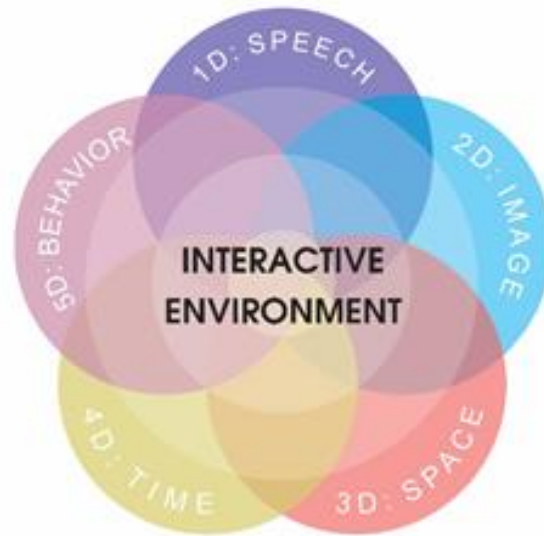


Figure 3. Interactive environment model

In the field of HCI and user experience, it is possible to generalize the 5 dimensions of interactive design including 1D: Dimension of speech (words - word, speech - speech); 2D: Visual image, the type of graphic image that users interact with the interface. Graphic images may include typefaces, charts, symbols, photos, illustrations, animated graphics, video movies, and more; 3D: Dimension of physical space (physical object/space. - space) object); 4D: Time dimension (time that learners interact with the interface); and 5D: Dimensions of the behavior (actions that the user behaves with the interface and methods to respond to user actions) (Figure 3).

Therefore, in e-learning, learners should not be limited to the courses available in their area. Instead, more interactive learning with more interactive ways should be enhanced. For example, the ability to play live video or screen sharing, featuring an online whiteboard; providing a comprehensive online classroom environment designed for use by educational institutions as well as individual teachers and tutors; live stream interactive multimedia presentations.

7. Conclusion

In the context of globalization and Industry 4.0, teaching and learning need to adapt quickly to all upheavals. Technology development enables learners to access a wide range of learning models and methods, and thus changes the concept of schools, classrooms, learners and teachers. Exposure to more updated technologies forms a gap between lecturers and learners and enables e-lecturers to become complementary solutions to e-learning teaching. Lecturers teach through non-traditional learning methods. Technology integration in the classroom has led to many new trends. The rich digital content and the ability to absorb e-

learning knowledge of each individual will also depend on virtual classroom interaction with virtual instructors. Teachers in the digital age need to update their knowledge, transform it flexibly and be able to adapt to changes of global development. In this context, it is necessary to build a dynamic, creative, and tertiary education service to approach the region and the world.

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