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Pedagogical Factors Influencing University Instructor Use of e-Learning

Su-Chen WANG
The Computer and Network Center, National Chen-Kung University, Taiwan
suchen1@gmail.com

Abstract: Blended courses that include both face-to-face and e-learning have been offered in many universities in Taiwan but very little research has been undertaken on instructor perspectives of the pedagogical factors. This paper explores the pedagogical factors that influenced instructor use of e-learning in a national research-based university in Taiwan. An interpretive paradigm utilizing qualitative method was adopted. The paper outlines the findings from 27 e-learning instructors in in-depth interviews about instructor perceptions of pedagogical factors. The findings suggested instructors needed to adopt different pedagogical approaches to work with new media in developing their e-learning courses so new curriculum design, new teaching methods, new ways of assessment, and new interaction approaches were needed. All the instructors thought e-learning teaching is different from traditional teaching in three aspects: instructor's role change to become more of a facilitator, knowledge and skills needed for e-learning instructional design and technology, and need to be well prepared before class for e-learning teaching. However, instructors may be reluctant to change. University administrators interested in solving the issue of the under-use of e-learning would be wise to recognize the challenges instructors face and to provide the necessary support to help overcome these barriers if they wish to promote the use of e-learning as a part of the blended delivery of courses.

Keywords: e-learning, blended learning, university instructors, pedagogy, factors

Introduction

Courses may be delivered completely online or via 'blended learning' which involves a combination of face-to-face and an online component of technology-based learning [1][2]. E-learning is a key component of blended learning and was the catalyst for the rapid growth in this form of learning [3]. Currently many institutions are opting for the blended learning delivery of courses [1]. Blended courses has been offered in universities in Taiwan but very little research has been undertaken on instructor perspectives of pedagogical factors that influenced instructors use of a blend of e-learning and face-to-face instruction.

E-learning allows the delivery of teaching materials electronically. It involves the use of ICT such as e-mail, the Internet, audios/videos, videoconferencing, mobile, CD-ROMs, DVDs, television, and satellite broadcasting. The use of ICT can remove time and place constraints on teaching and learning to provide the flexibility that many tertiary students are now demanding [4][5]. The Taiwan government has built up a good ICT infrastructure and encouraged universities to develop e-learning systems but questions such as "What are the pedagogical factors that influenced instructor use of e-learning?" are being asked by educators in Taiwan. This paper outlines the study research design and findings from interviews with 27 e-learning instructors at the National Research University (NRU, a pseudonym). These voluntary e-learning instructors were asked about their experiences of

e-learning and perceptions of the pedagogical factors that influenced instructor use of e-learning teaching.

Background literature and research design

University instructors in Taiwan have begun to use universal Internet access, multimedia, and state of the art computer labs, wired and wireless campus network for teaching and learning because these have been implemented and become mainstream [6]. However, instructors may misuse of technology because they fail to see its real potential [7]. Firstly, technology may be seen as a teaching tool to support current ways of teaching only. Secondly, technology may be used as an add-on element to the traditional instructor-centered and subject-based curriculum. Regarding computers as tools or add-ons can undermine the potential value of a computer-rich environment and prevent instructors from changing their pedagogy. Stratford (2000) [8] suggests that only if the pedagogy is transformed are the real strengths of technology utilized.

Studies reveal that most of instructors are ill-prepared to make the shift from the traditional face-to-face classroom setting to the online academic forum due to a general lack of understanding of what it entails to teach courses online [9]. The barriers hindering the development of e-learning are not only technological but also pedagogical [10]. Levine and Sun (2003)[10] asserted that although instructors have a fair knowledge about how to use technology, instructors do not know how to customize e-learning as a highly interactive medium of learning in order to meet the individual needs of students. Thus, the misconception of e-learning and misuse of technology will lead to a poor quality of e-learning production. Thus, the demand of adequate pedagogy is an important factor for the e-learning practice.

Much literature has suggested e-learning has the potential benefits to increase institutional reputations and improve the quality of teaching and learning [11]. However, when instructors teach through e-learning they face multiple challenges such as the need for skills to work with new media, a lack of reliable technological infrastructure and support services, and the need for different pedagogical approaches [12][13]. Few articles discuss the views and experiences of instructors who teach on e-learning courses in Taiwan. Why some instructors use e-learning and others do not is of interest because instructors are key people who put the technology and learning objects into practice [14][15]. Previous studies suggest that some instructors prefer face-to-face instruction to e-teaching because it provides for greater interpersonal contact. Research has also identified instructor concerns about recognition and administrative support [12]; teaching online is not always highly valued or rewarded in tenure and promotion decisions [16]. Taken together, these studies suggest that the motivating and inhibiting factors for instructor e-learning use may be both personal and to do with the context of university policy along with technological and pedagogical factors [15]. In this paper we elaborate on university instructor perspectives of the pedagogical factors for their engagement in e-learning.

An interpretive paradigm utilizing qualitative and quantitative methods was adopted to gain rich data on instructor perspectives of the factors they faced in their e-learning teaching [17]. The 150 instructors who used "Networking Teaching and Learning System" at NRU were asked to respond a questionnaire on aspects of their use of e-learning. Simultaneously, the questionnaire respondents were asked if they were prepared to be interviewed. The data for this paper is from 27 e-learning instructor interviews about the pedagogical factors that affected their e-learning teaching. The instructor volunteers came from different departments within a number of different colleges at NRU. The same questions were asked of each instructor but because the interviews were semi-structured not all instructors discussed the questions in the same depth. The interviews were conducted and

transcribed in Mandarin and then translated into English. In order to ensure the veracity of this translation, two colleagues who knew both Mandarin and English verified the transcripts of a sample of the interviews. The qualitative comparative method was used to analyze the transcripts [18](Ragin, 1987). The researcher read all the transcripts and manually highlighted the quotes that fitted into the categories. The following will describe the pedagogical factors that affected instructor use of e-learning.

The Findings

All the interviewed instructors said they needed to spend more time and effort on their e-learning teaching because it was significantly different from traditional classroom teaching. The instructors pointed out that in e-learning the role or main responsibility of instructors had changed from an instructional designer to discussion guide. As science e-learning instructor D remarked, "I need to change my role to be a discussion guide and problem-solver rather than only be an instructional designer or the practitioner for my teaching strategy" (SeiDi.4.5.1). A non-science e-learning instructor reiterated this point. In addition, she emphasized the added technology requirements associated with e-learning. She pointed out, "Instructors are not just responsible to prepare their course materials to teach in e-learning but also need to become a problem solver to help their students to solve all the related technical problems within their e-learning environment" (NSeiKi.12.4.6).

The lack of instructional design capability and technology knowledge and skills were seen as influences on instructor use of e-learning. A science e-learning instructor remarked:

> *Although personal will, capacity, and time are three important factors that influence the instructors' teaching in e-learning, we still need to consider the instructors' capability to use multimedia or other technologies in their instructional design. For example, instructors may teach well but may not be a good video director. Usually they don't know how to conduct a video class or write a good course curriculum for e-learning teaching. (SeiA.6.3.2)*

They suggested that one strategy to enhance instructor use of e-learning practice would be to demonstrate e-learning system functions and to teach instructors how to develop their e-learning instructional design. They thought this approach would be helpful for science instructors. Some comments were:

> *The instructors must be re-trained on how to use multimedia to develop their e-learning courses especially for science education. So, science instructors should attend some seminars or demonstrations and learn how to use and develop e-learning courses. (SeiEi.3.5.7)*
>
> *An effective strategy of enhancing e-leaning practice is to broadcast the benefits of e-learning and teach instructors how to develop their e-learning instructional design especially for persuading science instructors to use e-learning teaching. (NSeiMi.5.1.4)*

Eight instructors also pointed out that some instructors may not be comfortable with being video-recorded. Science e-learning instructor C explained:

> *I am afraid my face will become uglier because of the quality of video facility. It will decrease my students' good impression of me. Moreover, it depends on the instructors' attitudes whether they want to be video-recorded with all their gestures in class and for this to be open to the public as a testimony. Maybe they just like their written words in the blackboard to be video-recorded. Moreover, the images on the video always move forward and backward and it makes us feel uncomfortable when we look at the video. (SeiCi.3.3.3)*

The instructors reported they spent a lot of time and effort in modifying videos of class teaching. A non-science e-learning instructor stated, "Sometimes I need to exclude the jokes or the 'byword' or some ugly images (pictures) from the class video. All these tedious tasks take me lots of time and effort. I don't like to revise it" (NSeiCi.3.5.6).

All the interview instructors thought there was a greater need for before class preparation with e-learning. A science e-learning instructor stated, "E-learning needs more time to prepare course materials well before and after class and also needs to spend more effort to think about the courseware, content, and pedagogy" (SeiAi.3.3.1). Some of them indicated they spent much time transferring their old transparencies into PowerPoint files or developing new PowerPoint files for their e-learning courses. Non-science e-learning

instructor Q said, "In the beginning I spent much time transferring my old transparencies into PowerPoint files or putting my course materials into PowerPoint files which include figures, texts, equations, and pictures. The figures and pictures are very important to my class" (NSeiQi.2.5.1). This was seen as of greater significance for those instructors who relied on their reputations to carry them through the face-to-face teaching. For these instructors, e-learning required a major change in their teaching approach. Science e-learning instructor A remarked:

> *Usually some older and famous instructors like their lecture teaching style because they do not need to prepare all the course materials before the class. Sometimes they prepare the lecture materials just one night before the class. For teaching e-learning courses, they must be well prepared. The instructor must prepare the syllabus, well-designed curriculum, and all services on program for an e-leaning course before the class begins. (SeiAi.9.1.3)*

However, twenty e-learning instructors thought other instructors would resist any changes to their teaching approach. Science e-learning instructor E stated, "The instructors often persist in their attitudes and perceptions of teaching and learning and they would not like to change their teaching methods and styles" (SeiEi.5.8.6). They also discussed the particular pedagogical issues in terms of the characteristics of the course/subject attributes and the influence of size of the classes when they went to revise or redesign their course materials in e-learning. Science e-learning instructor F argued that course design depends on the course/subject attributes. He stated:

> *Each different subject/course has different ways to share the course materials. All the instructors must redo or revise their course materials onto the e-learning system. For instance, one instructor let his student assistant help him scan all the textbook's figures/pictures into his PowerPoint files to teach a General Chemistry course. (SeiFi.3.2.3)*

Some science courses might not be appropriate for e-learning teaching because of their course/subject attributes, such as the inclusion of abstract science knowledge and formulae. Some comments were:

> *It is hard to express abstract science concepts in e-learning because these need some body-language to explain. For instance, in inorganic chemistry I usually use my fingers to express the rotary motion. Moreover, for the use of formulae, I use a traditional teaching style in which I write on the blackboard/whiteboard and then video-record it. It is difficult for me to design and express well in e-learning teaching. (SeiCi.3.5.6)*
>
> *Maybe in College of Science there are lots of formulae to be used and explained to the students and it is hard to express this well in e-learning courses. (NSeiSi.2.25.2)*

By way of contrast, science e-learning instructor B did not agree that abstract knowledge in science was hard to develop via e-learning. Animations, simulations and pictures could be used. He stated:

> *I don't think the course contents and curriculum which contain science abstract concepts will be hard to develop in e-learning. On the contrary, the abstract concept of course content is easier to express well in an e-learning course if you use many animations, simulations, pictures, and figures to explain clearly. (Sei.Bi.2.26.2)*

Furthermore, science labs did not necessarily cause problems, videos, pictures and demonstrations could be used instead. Science e-learning instructor A explained:

> *I think different Colleges have different needs. However, I don't think the subject or content attributes in science education such as lab operation will cause any troubles in developing e-learning courses. For example, we saw lots of lab operations or outdoor science education videos on the 'Discovery' channel. By using camera or audio/video equipment, we can catch lots of real actions or pictures to teach our students. (SeiAi.6.2.3)*

Science e-learning instructor B also described the use of simulations and virtual experiments for science labs. He stated:

> *Chinese Technology University has a set of software for student lab experiments on the computer. It has not only simulations but also lab equipment on the computer. The students only need to click the mouse to choose one of various selections and the system will do all the different virtual experiments for you. (SeiBi.2.26.3)*

There was some feeling that e-learning was better for general rather than advanced courses. Hence, science e-learning instructor A suggested that basic or general courses should be developed and taught in e-learning and the more specific and advanced courses should continue to be taught in face-to-face style.

> *If the course subject has more basic knowledge or concepts, it should be encouraged to teach in e-learning in order to avoid the instructor spending too much time to teach it repeatedly. If the course subject such as graduate course is too specific to teach in e-leaning, then it had better use more face-to-face teaching.*

> *Otherwise, it will cost the instructors much time and effort in developing and teaching in e-learning for university students. (SeiAi.9.2.1)*

The instructors identified the differences between compulsory and elective courses. They suggested it would not be worthwhile to develop elective courses for e-learning because the content often changed and student numbers tended to be relatively small. Science e-learning instructor A noted:

> *I think lots of compulsory courses such as Physics, Calculus in College of Science are appropriate to teach in e-learning. The contents of elective courses usually change very often and variously, so it is not good for e-learning. Moreover, the students taking the elective course are few, too. (SeiAi.9.3.1)*

The instructors noted many compulsory courses could be developed in e-learning and many students could take advantage of this benefit because the compulsory course was often a big size of class. Science e-learning instructor A speculated that around one third of the courses at NRU could be developed in e-learning, but pointed out, "it also depends on the instructors' will". Science e-learning instructor B agreed:

> *The compulsory courses belong to the basic core courses. The elective courses are more advanced courses. The advantage of the compulsory course is that the students must take and study them. They have no choice, so they need to study hard to pass it. I feel the effectiveness of e-learning on the compulsory course will be better and more students will get this benefit because the compulsory class is usually a big class for more students to take. (SeiBi.4.3.2)*

Referring to instructor perceptions of their students, all the instructors considered most students are not active learners so they needed to use different teaching approaches to improve the students' learning. Simultaneously, the instructors found the effectiveness of e-learning to be better for diligent students but of no use for passive students. A non-science e-learning instructor remarked:

> *The students usually are passive learners. We have found the effectiveness of e-learning outcomes is good for those diligent students but no use for those passive students. If the students dare to choose my course, they will be active learners and they will improve themselves very well. I think the students must be active learners and require themselves do their best in their study, otherwise the learning outcomes will be better no matter what kind of teaching styles are. (NSeiDi.6.3.2)*

Science e-learning instructor A reiterated the relationship between the students' learning attitudes and teaching approaches. He stated:

> *I think most of students still come to class if they are active learners. If the students are passive or lazy, then they still do not come to class no matter what you use, what kind of teaching methods. I do not worry that students will not come to class if I put the videos and all my course materials on the web. (SeiAi.1.2.1)*

Science e-learning instructor A did not give his students any assignments or quizzes because the participants were not only university students but also community people. He explained:

> *Because my participants are not only the university students but also the community people, I need to make my course materials easy to read and understand just as the newspaper reporter does. Thus, I do not use any Mathematics Formulas and/or English words in my class. There are two open-book exams (mid-term and final) and no assignments for this course. I prepared two exams' questions and count all students' grades. (SeiAi.3.1.3)*

However, other instructors gave many quizzes to their students in order to stimulate them to preview online materials before class and to encourage them to attend class (see Section 5.2.3). They saw this is a way to improve their students' learning outcomes.

Sixteen instructors noted they had video-recorded their classroom teaching and six instructors video-recorded their student performances in class. They revised the videos before putting them onto the system, and their students could download and review the videos. Some of them indicated that in addition to video-recording their lectures they also provided additional professional videos for their courses (see Section 5.2.3).

Concerning online discussion, nine interviewees provided this function but they thought it was not very effective. Science e-learning instructor A stated:

> *This course provides an online discussion area but it is not effective. Every time in class I give at least five minutes to let them ask questions, therefore all the students in the different universities can see and listen synchronously just like a video conference. The students also can ask the student assistant questions after class. (SeiAi.3.1.2)*

A non-science e-learning instructor noted:

> *In my e-learning course, they can discuss on online discussion area or ask questions by using email. However, the students seem not use online discussion very often and maybe they are not used to ask questions in this way because it takes time to type in and it is hard to describe the questions and answers well online. (NSeiNi.3.1.7)*

Science e-learning instructor B did not use online discussions. He thought he did not need this function because he already had many discussions in class. He also worried about network connections and his students were not far away from campus. He explained:

> *I have put all my course materials on the system and spend lots of class time in discussion so I don't use online discussion. Simultaneously, I worry about the network problems which include some students who do not have computers or cannot connect to the system. Moreover, all my students are NRU students on campus and they can come to class to have a discussion. They do not need to stay at home and discuss online. (SeiBi.6.7.9)*

The instructors thought it was important that there was two-way communication between them and their students and face-to-face discussions were best for this. A non-science e-learning instructor said:

> *I feel face-to-face discussion is better than online. I think in the class if the teacher only transfers their knowledge to their students in one direction; it will be boring and few interactions among them. I think I had better put my knowledge transfer part on the system and increase more interactions and discussions in class. (NSeiPi.5.3.5)*

Science e-learning instructor A noted some specific courses such as 'Satellite Information and Life' also could be taught explicitly and in depth by using colloquial words or phrases. He described:

> *When I taught this general 'Satellite Information and Life' course in both distance education and e-learning ways, I always think about how to use colloquial words or phrases to explain this specific field of knowledge explicitly and in depth for all of my students particularly who come from the community. I did lots of seminar presentations or speeches before. I think a speech or a lecture is similar to a part of 'general education' course although their participants are very different. (SeiAi.7.4.2)*

Ten interviewed instructors also indicated that they used many online case studies and examples that related to student daily life to motivate their interest and improve their learning outcomes. Science e-learning instructor A stated, "I give many online case studies and examples that are related with our daily life, such as 'Satellite Guided System' for car drivers and so on" (SeiAi.2.2.7). A non-science e-learning instructor also noted, "I also gave many online case studies or examples in my 'Electricity and Life' course" (NSeiMi.5.6.3).

Some instructors indicated they needed to be supported by the university to overcome their pedagogical challenges in their e-learning teaching. Science e-learning instructor B remarked, "The University needs to provide more support services to help instructors in their development of e-learning courses such as providing seminars for new instructional design or new teaching approaches and so on" (SeiBi.6.2.1).

Discussion and Implications

This paper has described instructor perceptions of the pedagogical factors that affected their use of e-learning. All the instructors thought e-learning teaching is different from traditional teaching in three aspects: instructor's role change to become more of a facilitator, knowledge and skills needed for e-learning instructional design and technology, and need to be well prepared before class for e-learning teaching. However, instructors may be reluctant to change. Moreover, while the interview instructors were able to list the benefits of e-learning for them, the students and the university, they raised a number of pedagogical issues such as how e-learning is different from the traditional teaching, the impact of science course/subject attributes on course design, the influence of class size (ratio of instructor and students), and teaching approaches. Each instructor had their own ideas about their class teaching approaches such as assignments and quizzes. Some instructors noted they did not give assignments or quizzes depending on the students in class. Some instructors mentioned the need for explicit explanation of 'specific' field knowledge/words using common and colloquial words for their students particularly those who came from the community because the course belongs to the distance education and e-learning course. Furthermore,

instructor perception of the students' learning attitude was seen as a significant influence on the use of different e-learning teaching approaches. They all suggested that instructors, including science instructors, needed to be re-trained on instructional design and technology skills for e-learning.

A majority of instructors involved in the study pointed out that e-learning not only relies on multiple ICT technologies but also that technology innovation is ongoing and so instructors are continuously faced with pedagogical, personal, and technological challenges. The assertion from a majority of instructors was e-learning was significantly different from face-to-face instruction and so they need to adopt different pedagogical approaches. However, respondent instructors indicated that actually most instructors have had little or no formal training in the effective use of technological resources in e-learning. The general perception was that they would benefit from training in this, either from the university and or external professionals. The contention that training is important to create a shift in teaching practice is supported by Palloff and Pratt (2001)[9].

Overall, the findings of the study indicate that in the face of ongoing technology demands instructors not only feel they lack time but some also experience challenges from their personal expertise and beliefs to the incorporation of technology into course design. The findings indicate instructors perceive pedagogical challenges from e-learning that might hinder instructor personal motivation to adopt e-learning teaching. These include lack of time, support, pedagogical and technical skills. University administrators interested in solving the issue of the under-use of e-learning would be wise to recognize the challenges instructors face and to provide the necessary support to help overcome these barriers if they wish to promote the use of e-learning as a part of the blended delivery of courses.

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