APPLYING INFORMATION AND COMMUNICATION TECHNOLOGIES FOR LEARNING AMONG PRE-SERVICE BIOLOGY TEACHERS IN SCHOOL OF EDUCATION, VIETNAM

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ABSTRACT

Pre-service biology teachers (PBTs) are required to apply for information and communication technologies (ICTs) in their learning and professional teaching in the future. This study aims to investigate the applying need of ICTs for learning among PBTs, in Vietnam. A cross sectional survey was conducted on 106 PBTs in Can Tho University, Vietnam. Most of the PBTs (84.9%) were at moderate ability level of applying ICTs in their learning. PBTs have high percentage of advanced skills in using word processing and email. The attitude towards applying ICTs in learning of PBTs is positive. Applying ICTs for learning among PBTs in Vietnam is not high. However, applying ICTs for learning, not only helps PBTs enhance quality of teaching, but also helps them to further learning in advance in the future. Future intervention should be conducted to increase the ability of applying ICTs, to improve the quality in learning, during teacher education training program for PBTs in Vietnam.

KEYWORDS: ICTs, Applying, Pre-Service Biology Teachers and Vietnam

Original Article

INTRODUCTION

Information and communication technologies (ICTs) is a term that refers to transferring, processing, storing, creating, displaying, sharing technology or accessing information (Meleisea, 2007). ICTs include radio, television, video, DVD, phone, satellite systems, computer and network hardware and software, as well as the equipment and services related to these technologies (such as videoconferencing, email and blogs) (Meleisea, 2007; Tech Term.com, 2010). Applying ICTs is rapidly increasing, and it plays a major role in society globalization (Educational Testing Servicervice, 2007).

In society globalization, not only information is important itself, but also how to approach it. Therefore, applying ICTs is extremely important. ICTs lead to significant impact in education. ICTs are applying through the schools to make greater accessible education and improve quality of teaching and learning (Meleisea, 2007). It becomes the most important tool to support teaching and learning; and to develop student competences (Vajargah, Jahani, & Azadmanesh, 2010). These benefits of ICTs in education are clearly indicated by previous studies, which have demonstrated that using ICTs in teaching has great impact on students (Ben Youssef & Dahmani, 2008; Lee et al., 2011; Potyrala, 2003). ICTs promote dynamic learning environment, such as collaborating, creating, integrating, and evaluating in learning process by students (Mikre, 2011). ICTs also increase self-learning environment that contribute to more constructivist learning of students (Mikre, 2011; Reddi, 2004; Volman, 2005).

Therefore, using ICTs improves study results. A previous study has shown the significant higher study results among using ICTs students related to not using ICTs group (Kulik, 1994). Khan et al. (2011) have found that applying ICTs among students significantly improves their GPA (Khan & Bhatti, 2011).

Besides that, using ICTs in education may erase the distance and climate insensitivity; make high speed delivery and wide reach information; uniform quality and lower the cost of education (Reddi, 2004). ICTs improve active and creative competences of teachers; help them to manage student learning (Anderson & Weert, 2002). It also enhance teachers' pedagogy and content knowledge (Mishra & Koehler, 2006). With numerous benefits, ICTs have been recommended and applied for teaching and learning (Aseembly, 2005; Assembly, 2000s; MOET, 2008). ICTs have also been discussed and applied through schools by policy makers, school leaders, teachers and parents.

In science education, particularly in biology education, teaching and learning are facing with many difficulties, including the strange, complex and abstract concepts (Scott, Boyd, Scott, & Colquhoun, 2014). Nowadays, talk and chalk teaching method has gone to traditional methods (Ali, 2013), which could not attract students' attention to the lessons and to understand the lesson easier (Akindutire & Ekundayo, 2012; Nguyen, Williams, & Nguyen, 2012). In order to attractively improve biology teaching and learning, ICTs are extremely important tools. ICTs help students to visually view the difficult and impossible objects or extinct animals. ITCs provide animation software for students do their life science experiments. ICTs help students in collecting, storing, analyzing and sharing information in learning biology. Therefore, ICTs should be applied in the biology lectures of teachers (Shedd, 2004), especially for those who will become biology teachers. PBTs are required to have sufficient knowledge and competences about ICTs. They enhance their learning process and develop their professional teaching in the future. However, in the actual circumstance, applying ICTs in learning biology among PBTs is inefficiency. Although perception of pre-service teachers (PTs) about applying ICTs is high, the use of ICTs in their learning is far from demand. Many of PTs also reluctant and lack enthusiasm to applying ICTs in learning, or they may not have enough ICTs skills. Moreover, PTs may be addicted to Facebook, chat rooms and online gaming, which are the drawbacks of using ICTs in learning (Mikre, 2011). Studies about applying ICTs in biology education received much attention (Khan & Bhatti, 2011; Kola Jacob, 2013; Potyrala, 2003; Rolando, Salvador, & Luz, 2013; Skrzypek, Potyrala, & Walosik, 2011; Yapici & Hevedanli, 2012). On the other hand, investigations applying ICTs in PBTs received a little attention with the specific aspects (Skrzypek et al., 2011; Yapici & Hevedanli, 2012). Consequently, investigations about applying ICTs in PBTs still require more evidences for improving high quality of biology teaching and learning in the future.

It is well established that applying ICTs in education systems of developed countries is comparatively advanced than in education systems of developing countries (Mikre, 2011). In Vietnam, the education system is getting innovatory. In teaching approach, the teacher-centered method is shifting to learner-centered method (Aseembly, 2005), with effective supports from ICTs tools. The old generation teachers are being transformed by younger generation teachers, who may be better in applying ICTs in their lectures. At the policy level, national ICTs in education plans and policies have been running by the Vietnam Ministry of Education and Training, since 2008 (MOET, 2008). Nowadays, Vietnam is in infusing level of ICTs integration in education in Southeast Asian Countries (Maftuh, 2011). However, not all the Vietnamese schools are at that level; many rural schools are in the lowest level of ICTs integration (Maftuh, 2011). Even at higher education level in Vietnam, applying ICTs is not an adequate demand. Previous studies also point out the frequency of applying ICTs at university as not much popular (Nguyen et al., 2012; Peeraer & Petegem, 2010), and it requires more

training (Peeraer & Van Petegem, 2011). Literature review shows some previous researches about applying ICTs at university level (Nguyen et al., 2012; Peeraer & Petegem, 2010), but all of them focus on lecturers.

To the best of our knowledge, none of the studies has investigated about applying ICTs in PTs, who will become the teacher in the future, especially in PBTs. The major objective of this study was to investigate the whole portray of the current status of applying ICTs for learning among PBTs, in Vietnam. This study seeks to address the following questions: (i) How do PBTs apply ICTs? (ii) What do they think about the impact of applying ICTs? And (iii) what is their attitude related to applying ICTs? We hypothesize that the attitude of PBTs in applying ICTs may be high, but their applying ICTs in their learning may have some limitations. The outcomes of this study could serve as a future reference for lectures and instructional leaders, seeking strategies that help PBTs improve the ability of applying ICTs, and improve the quality in learning, during teacher education training program in Vietnam.

METHODS

A cross sectional survey was conducted in PBTs in School of Education of Can Tho University, in the South of Vietnam.

Study Subjects

The participants of this study were 106 PBTs. Of the total participants, 73.6% were female and 26.4% were male PBTs. The study was implemented in all level of PBTs, from the first year to the final year students. The percentage of PBTs in the first academic year was 23.6%. Percentages of the second, third and fourth year PBTs were 33.0%, 16.0% and 27.4%, respectively.

Instrument Structure

A paper instrument, with closed-response questionnaire was used for this study. The questionnaire was developed based on the previous questionnaires (Durndell & Haag, 2002; Lavonen, Juuti, & Meisalo, 2003; Lee et al., 2011; Paris, 2002; Swain, Monk, & Johnson, 2000; Tsai, Lin, & Tsai, 2001). The instrument included 4 major aspects. (1) The first aspect was designed to ask about baseline characteristics of sampling. (2) The second aspect was used to determine the applying of ICTs in PBTs, with 4 main questions: (i) self-evaluation about ability of using ICTs (ii) skills and competences of PBTs in applying ICTs activities; (iii) frequencies of applying ICTs in learning activities; and (iv) participating in learning activities with using ICTs in the classroom. (3) The third aspect was developed to examine how ICTs impact on PBT learning. (4) The fourth aspect was used to investigate the attitude of PBTs in applying ICTs by Likert-scale questions (The Likert-scale question was designed with four points; which excluded for the midpoint to avoid students hold the fair-mind option and express their idea only one side or other side (Brown, 2000)).

Data Collection

Participants were randomly selected, after they had finished their learning. Study instruments were directly delivered to each student, and they were suggested to complete the questionnaire in 15minutes. Each student used a pencil to tick their response on the questionnaire survey.

Data Analysis

All completed response questionnaires were collected, then coded and analyzed. The percentage was used to
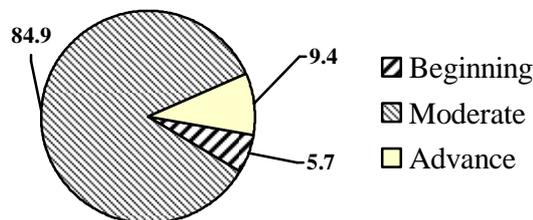
describe the study results.

RESULTS

Figure 1: Self-Evaluation about Ability of Using ICTs

Figure 1, shows the self-evaluation about ability of applying ICTs by PBTs. Most of PBTs (84.9%) were at moderate ability level of applying ICTs. The percentage of PBTs at advanced ability level of applying ICTs was not high (9.4%), and the lowest percentage of applying ICTs was 5.7% for beginning level.

Table 1: Skills and Competences of PBTs in Applying ICTs in Learning Activities

Skills and Competences	Never N (%)	Beginning N (%)	Moderate N (%)	Advanced N (%)
1. Produce text using a word processing program	3 (2.8)	25 (23.6)	39 (36.8)	39 (36.8)
5. Edit a questionnaire online to improve their making questionnaire skill	40 (37.7)	50 (47.2)	12 (11.3)	4 (3.8)
6. Email a file to someone/another student or teacher	2 (1.9)	18 (17.0)	43 (40.6)	43 (40.6)
9. Participate in a discussion forum on the Internet	47 (44.3)	44 (41.5)	10 (9.4)	5 (4.7)
10. Create blogs or web sites and maintain them	47 (44.3)	37 (34.9)	18 (17.0)	4 (3.8)
12. Participate in social networks and use most of their features	5 (4.7)	10 (9.4)	43 (40.6)	48 (45.3)

The percentage of PBTs that had advanced skills in participating in social networks was the highest (45.3%); then followed by skill to email a file to someone (40.6%) and produce text using a word processing program (36.8%). Most of half (44.3%) of PBTs had never participated in a discussion forum on the internet or had never created blogs or web sites and maintain them. Percentage of PBTs that had never edited a questionnaire online was 37.7%. All the details of PBTs' skills are presented in Table 1.

Table 2: Frequencies of Applying ICTs in Learning Activities by PBTs

Applying ICTs	Never N (%)	Several Times a Month N (%)	Once a Week or More N (%)	Every Day or Almost Every day N(%)
1. Sending and reading emails	1 (0.9)	21 (19.8)	50 (47.2)	34 (32.1)
2. Chatting online	5 (4.7)	31 (28.3)	40 (37.7)	31 (29.2)
3. Searching and collecting information via internet	0.0	10 (9.4)	45 (42.5)	51 (48.1)
5. Posting your work on school website	76 (71.7)	24 (22.6)	4 (3.8)	2 (1.9)
6. Participating the online forum relate to the learning topics	75 (70.8)	21 (19.8)	9 (8.5)	1 (0.9)
9. Contribute to and/or create blog or discussion forum about learning topics	77 (72.6)	23 (21.7)	5 (4.7)	1 (0.9)

Table 2 indicates the frequencies of applying ICTs in learning by PBTs. The percentages of PBTs applying ICTs

to send email, to chat online, to search information via internet every day or almost every day were high (32.1%, 29.2%, 48.1%, respectively). The percentages of students applying ICTs to participate in online forum, contribute to and/or create blog and post their work on the school website every day or almost every day were very low (0.9%, 0.9% and 1.9%, respectively). All other applying ICTs activities are clearly presented in Table 2.

Table 3: Engaging of PBTs in Learning Activities with ICTs Usage in the Class Room

Activities	Never N (%)	Several Times a Month N (%)	Once a Week or More N (%)	Every Day or Almost Every Day N (%)
1. Listen to teacher presentation or explanation	1 (0.9)	13 (12.3)	57 (53.8)	35 (33.0)
2. Listen to a student presentation or explanation	3 (2.8)	18 (17.0)	53 (50.0)	32 (30.2)
3. Read a book or watch films or videos	10 (9.4)	61 (57.5)	29 (27.4)	6 (5.7)
8. Help each other to better understand and learn	3 (2.8)	19 (17.9)	58 (54.7)	26 (24.5)

The frequency of PBTs, who often listen to teachers' presentation and/or explanation with ICTs usage, was the highest (33.0%); it is followed by the frequency of PBTs, who often listen to other students' presentation and/or explanation with 30.2%. The percentage of PBTs, who often use ICTs to help other students to better understand and learn, was 24.5%. The percentage of PBTs, who often read a book or watch films or videos in learning activities in classroom, was the lowest (5.7%). All other learning activities using ICTs in classroom with the participation of PBTs are presented in Table 3.

Table 4: The Impacts of Applying ICTs on PBTs' Learning

ICT Impacts	Not at all N (%)	A Little N (%)	Somewhat N (%)	A Lot N (%)
1. Concentrate more on what you're learning	3 (2.8)	10 (9.4)	70 (66.0)	23 (21.7)
2. Try harder in what you're learning	2 (1.9)	20 (18.9)	66 (62.3)	18 (17.0)
3. Feel more independent in your learning (e.g. go over work again, find out more about things you are interested in)	3 (2.8)	26 (24.5)	59 (55.7)	18 (17.0)
4. Understand more easily what you're learning	3 (2.8)	21 (19.8)	63 (59.4)	19 (17.9)
5. Remember more easily what you've learnt	6 (5.7)	29 (27.4)	53 (50.0)	18 (17.0)
6. ICT enables you to work better with other students on tasks	3 (2.8)	24 (22.6)	56 (52.8)	23 (21.7)
7. ICT improves the atmosphere in class (e.g. students are more engaged, there is less disruption)	3 (2.8)	24 (22.8)	50 (47.2)	29 (27.4)

The impact of applying ICTs on PBTs' learning is shown in Table 4. Most of PBTs indicated that applying ICTs impact somewhat on their learning. The percentage of PBTs which demonstrated that ICTs improve the atmosphere in the class (e.g. students are more engaged, there is less disruption) had the highest rate at 27.4%. All the details of impact of applying ICTs on PBTs' learning can be seen in Table 4.

Table 5: Attitudes towards Applying ICTs of PBTs

Attitudes	Strongly Disagree N (%)	Disagree N (%)	Agree N (%)	Strongly Agree N (%)
2. Using a computer for learning is really fun	21 (19.8)	19 (17.9)	45 (42.5)	21 (19.8)
3. Using a computer for learning helps me to be more creative	11 (10.4)	47 (44.3)	39 (36.8)	9 (8.5)
4. I use a computer for learning because I'm very interested in computers	8 (7.5)	53 (50.0)	39 (36.8)	6 (5.7)
5. I forget the time when I'm learning with the computer	13 (12.3)	44 (41.5)	39 (36.8)	10 (9.4)
6. It's really worth using a computer for learning because it will help me in my future life as my lectures	19 (17.9)	27 (22.5)	48 (45.3)	12 (11.3)

Table 5: Contd.,				
7. I use a computer to learn as it will help in the professional teaching in the future	21 (19.8)	24 (22.6)	43 (40.6)	18 (17.0)
8. Learning things by using computers that will help me to get a good job	13 (12.3)	38 (25.8)	37 (34.9)	18 (17.0)
9. Learning with computer is important for me because I need it for my advanced study	22 (20.8)	22 (20.8)	43 (40.6)	19 (17.9)

Perusal Table 5 shows the attitudes towards applying ICTs of PBTs. The attitude towards applying ICTs of PBTs was positive. The percentage of PBTs, who agreed and strongly agreed that using a computer for learning is really fun, was the highest rate at 62.3%. The percentages of PBTs, who agreed and strongly agreed that "learning with computer is important" and "I use a computer to learn, as it will help professional teaching in the future", and "It's really worth using a computer for learning" were similar (57.6% and 56.6%, respectively). The percentage of PBTs, who agreed and strongly agreed that "I use a computer for learning, because I'm very interested in computers", and "I forgot the time when I'm learning with the computer" were 42.5% and 46.2%.

DISCUSSIONS

Applying ICTs in education in general, and particularly in biology education, improves the quality of teaching and learning (Meleisea, 2007). PBTs are required to have adequate skills and competencies about ICTs for their learning process and their future professional teaching. To the best of our knowledge, this is the first study about applying ICTs in PBTs in Vietnam, where the education systems is getting innovatory.

Our study pointed out that most of PBTs in Vietnam were at moderate ability level in applying ICTs for learning process (Figure 1). There are several possible explanations for this result. First, the Vietnam Ministry of Education and Training has launched the national ICTs program into education plans and education policies since 2008. Therefore, teachers and students have had more opportunities to access ICTs. Second, this result indirectly consists with the result from the previous study which showed that the Vietnamese are at infusing stage of ICTs integration in education among Southeast Asian countries (Maftuh, 2011). Third, the Vietnam economy is quickly developing. Applying ICTs is rapidly widespread for all areas, including education. And parents always support their children's learning. Hence, students have better approach with ICTs.

In our study, we also found the percentages of PBTs who had advanced and beginning levels of ability in applying ICTs were low. A possible explanation for these results may be, the distribution in our sampling. In our samples, we covered all year levels of PBTs, and the first year PBTs tend to little approach ICTs in learning, while the final year PBTs tend to frequently practice using ICTs. Percentage of PBTs at advanced ability level of applying ICTs was not high (9.4%). This result implies the necessity of ICTs training, which is consistent with previous study (Peeraer & Van Petegem, 2011). This result may be explained by the fact that Vietnam economy has just been changing. The PBTs may belong to the old generation of children, who did not have good conditions to approach ICTs in the past. Many of them have just started using computers, since they were enrolled to university.

Nowadays, social networks become more and more popular in daily life. Almost all students are using them for sharing information, discussing, posting their learning schedules... and relaxing. Social networks are a quick trend among students. Consequently, it is natural that the percentages of PBTs, who had advanced and moderate level skills in participating at social networks, were among the highest (45.3% and 40.6%). Using social network such as Facebook or

Line for learning is good sharing; however, the opposite aspect of social networks may be addictive for students to relax rather than using ICTs for learning (Mikre, 2011).

Another necessary skill in digital life is the email skill. Our study found that the skill to email a file to someone/another student or teacher of those, who are at advanced level and moderate level were both quite high (accounted for 40.6%). Producing text using a word processing program skill in our study was also high, for the advanced and moderate levels, which were both at 36.8%. These results are in agreement with the finding of the previous study, which has shown the closed to quite confident level of using Microsoft word processing among PTs in the Islamia University of Bahawalpur, Pakistan (Khan & Bhatti, 2011).

In order to handle with many difficulties in biology teaching (Scott et al., 2014), PBTs need to have good ICTs skills to make visual views, animation presentations... However, our findings indicated the advanced skills in "Create a presentation with animations" and "Create a multimedia presentation (text, graphics, video...)" among the PBTs were low. Percentages of PBTs, who never create a presentation with animations and create a multimedia presentation, were 17.0% and 16.0%, respectively. These are profound skills for PBTs in their future professional teaching. It requires more attention from both lecturers and PBTs to solve these problems.

Percentages of PBTs, who had never participated in a discussion forum on the internet or had never created blogs or web sites and maintained them, were high. These skills at beginning level were also high. It is difficult to explain these results, but it might be related to their both inadequate professional knowledge and ICTs skills, and some PBTs may also reluct and lack of enthusiasm to use ICTs. These results are associated with the result in Figure 1, which shows that most of our PBTs have moderate level of applying ICTs.

Table 2 shows frequencies of applying ICTs in learning activities by PBTs. One of the positive results in our study is the high percentage of PBTs, using ICTs for searching and collecting information via internet, every day or almost every day (48.1%). There are normal connections in Table 2 and Table 1. The results of chatting online every day and sending/reading email every day in Table 2 was higher than other activities, which are related to the advanced level of skills of participating in social networks and email a file to someone. However, a limitation in our study is that we cannot ensure that all searching information activities, online chatting or emails were used to support learning only.

The highest activity which was using ICTs was listening to teachers' presentation and/or explanation; it is followed by listening to their friends' presentation and/or explanation (Table 3). It is in agreement with previous studies, which indicated that using ICTs for presentation by lecturers is the most popular (Nguyen et al., 2012; Peeraer & Van Petegem, 2011). In our findings, the percentage of PBTs, who watched films or videos in learning activities in classroom every day or almost every day, was the lowest. According to Nguyen et al (2012), the percentage of lecturers who use videos as learning resources every week was the lowest (6.1%) (Nguyen et al., 2012). These results do not satisfy our expectation because; most of the lecturers and PBTs use ICTs for presentation with Microsoft power point - a moderate ICTs technique. However, for strange, complex and abstract concepts or microorganism and extinct animals, short films or videos will be visually better.

It is clear that applying ICTs in teaching and learning will promote dynamic learning environment (Mikre, 2011). Our study also supports this issue by the percentage of PBTs who indicated "applying ICTs improves the atmosphere in class a lot" was the highest. When using ICTs in teaching, lecturers can set up many activities to encourage PBTs and

discuss (Anderson & Weert, 2002). It leads to better concentrate on learning and better working together by PBTs.

Several unsatisfactory expected findings in our results are the impact of applying ICTs on long-term memory and independent learning of PBTs (Table 4). Our results shows the percentages of PBTs who indicated "using ICTs does not have impact" and "has a little impact on their remembering and their self-learning" were high (33.1% and 27.3%, respectively). These results differ from previous studies, which pointed out that ICTs also increase self-learning (Mikre, 2011; Reddi, 2004; Volman, 2005). There are several possible explanations for this difference. First, Vietnamese education system is getting innovatory, but many students are in traditional learning methods, which focus on remembering rather than understanding, and passively gaining knowledge from teachers. The second reason is the main and fundamental source of knowledge for both lecturers and students in Vietnam are textbooks.

One of the factors associated with applying ICTs in learning by PBTs is, their attitude towards using ICTs. In the actual situations, PBTs are reluctant and lack enthusiasm to use ICTs, hence to enhance the applying of ICTs among PBTs, improving their attitude is necessary. Perusal Table 5 in our study presents the positive attitude towards applying ICTs among PBTs. These results is a bit lower than the finding from Yapici I.U. and Hevedanli M. (2012), which found the attitude score among PBTs is 3.76 ± 0.507 (with score scale range from 1 to 5 according to Likert scale) (Yapici & Hevedanli, 2012). Nevertheless, the attitude of PBTs in our study is not high. It will impact the applying ICTs in their learning and their professional teaching in the future. There are three likely causes for this result. First, PBTs do not required applying ICTs in their learning; second, the ICTs credits in ICT curriculum provide basic techniques, which do not sufficient related to their field; and third, they might lack of devotion in ICTs learning.

CONCLUSIONS

Applying ICTs in PBTs is very important for their quality learning and their professional teaching in the future. Our study investigates the applying ICTs in PBTs for enhancing learning qualification in Vietnam is not high. The findings of this study indicate that most of PBTs have moderate ability level of applying ICTs. In addition, the skill of using word processing or email is high, but the skill of creating a presentation with animation and multimedia presentation is low. The attitude towards applying ICTs in PBTs is positive. Future intervention should be conducted to find the way to increase the ability of applying ICTs in learning for PBTs, and help them improve qualitative learning and teaching in Vietnam.

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