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## **The Impact of B-Learning Modality to Information and Communication Technology Competence of Pedagogical Student**

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### **Abstract**

The most practical way to convince the pedagogical students see the effectiveness of Information and Communication Technology (ICT) in teaching is to put them into a rich learning environment of technology applications and show them the effect of such learning. In (*Dung Nguyen The & Thanh N.T., 2017b*), we have proposed ICT competence framework to evaluate ICT competence of pedagogical students in informatics specialized. Frame of this competence, including 7 competence components with 17 criteria. Based on this framework, we have studied the impact of learning in blended learning (B-learning) modality to the competence to apply ICT in teaching of preservice teacher. The results are analyzed and assessed below.

**Keywords:** *B-learning; ICT competence; ICT integration in educational; Preservice teacher; Using ICT in teaching*

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## Introduction

Many research results have shown that integrating technology brings many benefits for both teachers and students in the teaching process. With the evaluation of the impact of ICT in teaching science through the analysis and synthesis of information from 628 scientific publications concerned were conducted in 10 different countries, the authors suggest that enhanced ICT cognitive ability, self-learning ability of learners (Bennett, J., et al, 2006).

Moreover, using ICT competency is one of 8 competencies that pupil to be achieved upon completion of general education programs. Therefore, in addition to teachers who need to have the capacity of ICT to improve the quality of teaching activities of themselves, teachers can form and develop ICT competency for pupils in subject teaching process.

Van Thi Thanh Nhung et al in (Nhung V.T.T, 2013) suggested process training teaching skills in technology subject in E-learning environment for students, in which skills to use computers and software; building multimedia courseware skill; learning organizational skill, self-management activities with the students in e-learning are essential for preservice teacher to teach in this environment.

Nguyen Van Hien, in (Hien, N. V., 2011) also showed three trends in using ICT in teaching today, namely: ICT as a means of teachers; ICT is a means of teaching and learning of both teachers and pupils and ICT seems just the means of pupils, as new learning environments, virtual learning environment. From that, the author has pointed out some of the skills needed to be trained to develop the competence to apply ICT in the organization of teaching and learning for pedagogy students.

According to Bonk and Graham (2003), blended learning (B-learning) is defined with the following elements (Bonk C. J. & Graham, C. R (Eds.), 2003):

- the combination of instructional modalities or delivery media and technologies.
- the combination of instructional methods, learning theories, and pedagogical dimensions.
- the combination of online learning and face-to-face learning

We think that the trend to use B-learning modality will be more likely to be widely used in our country. Moreover, ICT is not only learning content, not just a means of teaching, teaching environment. ICT is also an important structural element in the process of teaching and learning. Therefore, improving the teaching competence on E-learning environmental and ICT competence for pedagogy student is a necessity in the current period of education in Vietnam.

Here, we are interested in ICT competence in a specific way, which is the competence to apply ICT in teaching and learning of teachers and especially pedagogy student, the teachers in the future. In the sections below, the applying ICT in teaching and learning competence is referred to ICT competence. Besides, with students in 3rd and 4th at the Pedagogical University has heightened awareness of careers in the future, so in the following paragraphs may be referred the pedagogy students are preservice teachers.

Also, as mentioned above the most practical way to convince students of pedagogical see the effectiveness of ICT in teaching is to put them into a rich learning environment of ICT applications and let them see the effect of such learning.

Therefore, the research to find out the impact of combined forms of teaching, B-learning to improve the ICT competence of preservice teacher is worthy posing.

In (Dung Nguyen The, 2015), (Dung Nguyen The & Thanh N. T., 2017a) we have mentioned the model of teaching, teaching process, teaching methods, how to organize teaching on online courses, assessment forms... with B- learning.

In (Dung Nguyen The & Thanh N.T., 2017b) we have proposed ICT competence framework to evaluate ICT competence of pedagogical students in Informatics specialized. Frame of this competence, including 7 competence components with 17 criterias. Based on this framework, we have studied the impact of learning in B-learning modality to the competence to apply ICT in teaching of preservice teacher. The results are analyzed and assessed below.

## Research Contents

### The purpose and questions of the study

There have been many studies on the need for training for preservice students, so that they can work well with the teaching process in B-learning, these factors should be considered when integrating technology in teaching as well as the effectiveness of the teaching and learning with the B-learning (see (Bonk C. J. & Graham, C. R (Eds.), 2003), (Bennett, J. et al, 2006), (Jo Tondeur, 2015), (Matthew J. Koehler et al, 2014), (Nhung V.T.T, 2013)). However, there should be research subjects with the learners, courses, conditions and specific educational circumstances. Furthermore, the effects of B-learning to the ICT competence of preservice students is still a research purpose is quite new.

The following question will be addressed in this study: Learning in B-learning model that affect the competencies of ICT application in teaching of preservice students?

### **Participants**

- Experimental group 1: Students who have attended the course "Introduction to databases system" with B-learning modality.
- Experimental Group 2: Some teachers and 4th year students have had/or never had learned with B-learning, at some of the Universities of Education in Hue, Da Nang, Quang Nam, Quang Ngai, Quang Binh and some teachers in Dong Nai, Binh Duong of Viet Nam.

### **Measure and instrumentation**

With the ICT competencies framework was we proposed and tested in (Dung Nguyen The & Thanh N.T., 2017b), with 3-level scale. We can see in detail the competency framework in the document mentioned above (Dung Nguyen The & Thanh N.T., 2017b).

The level of the scale is level 1, level 2 and level 3 are assigned corresponding to the number 1, 2, 3.

In the following section, the scale of (Dung Nguyen The & Thanh N.T., 2017b) will be called the ICT scale.

ICT competence of the respondents will be the arithmetic mean of the quantitative data of the 17 criteria for each object in the survey. Here will be denoted by ICTC.

After removal of the questionnaire replies unreliable, the data collected will be processed by Data Analysis ToolPak of MS Excel 2016.

### **Research design and research process**

For the experimental group 1, we have conducted a survey with the ICT scale, before and after taking the course in the form of B-learning, to assess the impact of B-learning to the learners' ICT competence.

We have organized courses teaching "Introduction to database system" in the form of B-learning, for a 2<sup>nd</sup> year student class during the academic year 2016-2017 with 29 students and two groups of 3<sup>rd</sup> year student class, in the school year 2014-2015 and 2015-2016, with a total of 97 students. We chose 97 of 3<sup>rd</sup> year students.

The issues related to the organizational model of teaching, teaching process, teaching methods, how to teach organizing on the online courses, assessment form ... of the B-learning modality, that we have been organizing for this course able to see specific in the documents (Dung Nguyen The, 2015), (Dung Nguyen The & Thanh N. T., 2017a).

For the experimental group 1, we have conducted a survey with the ICT scale, before and after taking the course in the form of B-learning, to assess the impact of B-learning to the learners' ICT competence.

In addition, the experimental group 1, they are 3<sup>rd</sup> year students, so pedagogical qualifications only at average levels. So, we only assessed as awareness of ICT capacity improving, should in the first part of the survey are added to the sentence "*I think, I can ...*".

With the experimental group 2, we conducted a survey with ICT scale, comes with questions to determine they had attended learn with the form of B-learning or not. Survey process with online form with Google Forms tool, the number of participants is 129.

However, because there is great disparity between the number of people who have studied (group E - Experimental) and not engage in learning (group C - Control) with B-learning form. Group C has 41 objects. We selected randomly the correct number of people in group E is equal to the number of group C. The number of surveys to assess the comparison between the two groups was 82, divided among two experimental and control groups.

In the following section, we focus on analyzing data for ICTC competence and three important competencies components: Applying ICT in assessment of student learning outcomes; Using ICT in the design and implementation in teaching informatics subjects in high school; Using ICT in management and organization of teaching. Here will be denoted respectively NL3, NL5 and NL6. This is the essential competencies of pedagogic. The competencies of the rest of ICTC are affected by many factors or not close to 3<sup>rd</sup> year students.

NL3, NL5, NL6 is the average of the quantitative data in their criteria.

In Table 1 and table 2 below, we have ICTC\_Pre, ICTC\_Post, NL3\_Pre, NL3\_Post, NL5\_Pre, NL5\_Post, NL6\_Pre, NL6\_Post. Pre and Post in turn be interpreted as before (pre-test) and after (post-test) intervention.

In table 3 and table 4, we have ICTC\_C, ICTC\_E, NL3\_C, NL3\_E, NL5\_C, NL5\_E, NL6\_C, NL6\_E, C and E in turn is understood as the control group and the experimental group.

### Data analysis and results and discussion

#### Analytical Results with the Experimental Group 1

After cleaning, the data of 97 of 3<sup>rd</sup> year students attended experiment, we retain 92 to conduct data analysis.

Table 1. Descriptive Statistics of ICTC, NL3, NL5 and NL6 before and after intervention

	ICTC_Pre	ICTC_Post	NL3_Pre	NL3_Post	NL5_Pre	NL5_Post	NL6_Pre	NL6_Post
Mean	1,51	1,70	1,38	1,86	1,50	1,68	1,48	1,86
Standard Error	0,04	0,04	0,06	0,07	0,04	0,04	0,07	0,07
Median	1,38	1,71	1,00	2,00	1,67	1,67	1,00	2,00
Mode	1,29	1,94	1,00	2,50	1,00	2,00	1,00	2,50
Standard Deviation	0,38	0,37	0,53	0,63	0,40	0,39	0,64	0,65
Sample Variance	0,15	0,14	0,28	0,39	0,16	0,15	0,41	0,42
Kurtosis	-1,31	-1,11	-0,66	-1,59	-1,43	-0,79	-1,32	-1,51
Skewness	0,28	-0,04	0,95	-0,27	-0,01	-0,71	0,72	-0,22
Range	1,24	1,29	1,50	1,50	1,33	1,33	1,50	2,00
Minimum	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Maximum	2,24	2,29	2,50	2,50	2,33	2,33	2,50	3,00
Sum	139,00	156,06	127,00	171,00	138,33	155,00	136,00	171,50
Count	92,00	92,00	92,00	92,00	92,00	92,00	92,00	92,00
Largest(1)	2,24	2,29	2,50	2,50	2,33	2,33	2,50	3,00
Smallest(1)	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Confidence Level (95,0%)	0,08	0,08	0,11	0,13	0,08	0,08	0,13	0,13

Table 2: Comparison of data before and after the intervention with the t-Test:  
Paired Two Sample for Means

t-Test: Paired Two Sample for Means								
	ICTC_Pre	ICTC_Post	NL3_Pre	NL3_Post	NL5_Pre	NL5_Post	NL6_Pre	NL6_Post
Mean	1,51	1,70	1,38	1,86	1,50	1,68	1,48	1,86
Variance	0,15	0,14	0,28	0,39	0,16	0,15	0,41	0,42
Observations	92,00	92,00	92,00	92,00	92,00	92,00	92,00	92,00
Pearson Correlation	0,90		0,74		0,73		0,73	
Hypothesized Mean Difference	0,00		0,00		0,00		0,00	
Df	91,00		91,00		91,00		91,00	
t Stat	<b>-10,52</b>		<b>-10,79</b>		<b>-5,99</b>		<b>-7,88</b>	
P(T<=t) one-tail	0,00		0,00		0,00		0,00	
t Critical one-tail	1,66		1,66		1,66		1,66	
P(T<=t) two-tail	0,00		0,00		0,00		0,00	
t Critical two-tail	1,99		1,99		1,99		1,99	

#### Analytical Results with the Experimental Group 2:

Table 3. Descriptive Statistics of ICTC, NL3, NL5 and NL6 of Group C and Group E

	ICTC_C	ICTC_E	NL3_C	NL3_E	NL5_C	NL5_E	NL6_C	NL6_E
Mean	1,54	1,75	1,52	1,94	1,50	1,72	1,50	1,98
Standard Error	0,06	0,05	0,11	0,10	0,07	0,05	0,10	0,09
Median	1,53	1,71	1,00	2,00	1,33	1,67	1,00	2,00
Mode	1,24	1,71	1,00	2,50	2,00	2,00	1,00	2,50
Standard Deviation	0,38	0,31	0,68	0,66	0,42	0,34	0,66	0,58
Sample Variance	0,14	0,10	0,46	0,44	0,18	0,12	0,44	0,34
Kurtosis	-1,45	-0,87	-1,59	-1,41	-1,69	-0,32	-1,44	-0,91
Skewness	0,15	-0,10	0,60	-0,31	0,01	-0,51	0,68	-0,30
Range	1,18	1,18	1,50	2,00	1,00	1,33	1,50	2,00
Minimum	1,00	1,06	1,00	1,00	1,00	1,00	1,00	1,00
Maximum	2,18	2,24	2,50	3,00	2,00	2,33	2,50	3,00
Sum	62,94	71,65	62,50	79,50	61,67	70,67	61,50	81,00
Count	41,00	41,00	41,00	41,00	41,00	41,00	41,00	41,00
Largest(1)	2,18	2,24	2,50	3,00	2,00	2,33	2,50	3,00
Smallest(1)	1,00	1,06	1,00	1,00	1,00	1,00	1,00	1,00
Confidence Level(95,0%)	0,12	0,10	0,21	0,21	0,13	0,11	0,21	0,18

Table 4: Comparison between group C and group E with z-Test: Two Sample for Means

<b>z-Test: Two Sample for Means</b>								
	<i>ICTC_C</i>	<i>ICTC_E</i>	<i>NL3_C</i>	<i>NL3_E</i>	<i>NL5_C</i>	<i>NL5_E</i>	<i>NL6_C</i>	<i>NL6_E</i>
Mean	1,54	1,75	1,52	1,94	1,50	1,72	1,50	1,98
Known Variance	0,14	0,10	0,46	0,44	0,18	0,12	0,44	0,34
Observations	41,00	41,00	41,00	41,00	41,00	41,00	41,00	41,00
Hypothesized Mean Difference	0,00		0,00		0,00		0,00	
Z	<b>-2,78</b>		<b>-2,80</b>		<b>-2,57</b>		<b>-3,45</b>	
P(Z<=z) one-tail	0,00		0,00		0,01		0,00	
z Critical one-tail	1,64		1,64		1,64		1,64	
P(Z<=z) two-tail	0,01		0,01		0,01		0,00	
z Critical two-tail	1,96		1,96		1,96		1,96	

## Results and discussion

Review of Table 2 and Table 4, we see with both experimental group, learning in B-learning model has certain implications for the ICT competence of learners.

Considering the degree of influence ES (effect-size coefficient) before and after intervention from table 1, We have the ES coefficient of ICTC, NL3, NL5 and NL6 respectively are: 0,48; 0,90; 0,45 and 0,60.

Moreover, from table 3 we have the ES coefficient of ICTC, NL3, NL5 and NL6 respectively are: 0,56; 0,62; 0,52 and 0,73.

Thus, according to Cohen's criteria, the impact of B-learning is significantly meaningful.

The analytical results with experimental groups 1, shows the impact of the B-learning model that we propose in (Dung Nguyen The, 2015), (Dung Nguyen The & Thanh N. T., 2017a) as well to influence the learners' ICT competence.

With the experimental group 2 we see that, with 129 subjects participated in the survey, up to 41 people answered that they had never learned in E-learning form. In our opinion, there are some survey participants view E-learning is a form of online learning with synchronous communication, so the number of respondents considered to be fairly large.

In addition, for the experimental group 2, we see the impact of this form of teaching B-learning is lower than the experimental group 1, the main reason as we have mentioned above is the ICT competence can be affected by many other causes.

## Conclusions

Obviously, there are many other factors affecting the ICT capacity of students and those surveyed, so here we only evaluate cognitive level. But in our opinion, the awareness in using ICT in teaching is also very important, because the use of ICT is not just about the engine itself, but also about education, about how teachers and learners using the tools to support teaching and learning.

Need to see that the tool does not automatically change the teaching and learning process. It all depends on how we use the tools. With technology, the teacher must put students into real world and put them as the center of teaching and learning with ICT applications.

The findings in this paper indicate that, should conduct teaching organization with B-learning model for pedagogy students, as well as in the work of regular refresher courses for teachers. This form of teaching will help to improve the ICT competence for teachers.

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