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Barriers to the Successful Integration of Information and Communication Technology (ICT) in Teaching as Perceived by Pre-Service Teachers of Biliran Province State University-Naval, Biliran Philippines

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A B S T R A C T

This study aimed to determine the barriers to the Successful Integration of Information and Communication Technology (ICT) in Teaching Encountered by Bachelor of Elementary Education (BEEd) and Bachelor of Secondary Education (BSEd) Pre-service Teachers of Biliran Province State University, Naval, Biliran Philippines. The descriptive research design was used in this study. The study revealed that both Bachelor of Elementary Education (BEED) and Bachelor of Secondary Education (BSED) pre-service teachers' identified "Lack of in-service training", "Lack of technical support", and "Lack of hardware (computer, printer, etc.) with the highest mean as barriers to successful integration of information and communication technology in teaching and "Knowledge and Skills about ICT" is were determined as the lowest in mean and interpreted as neutral as barriers in integrating ICT in teaching. A framework was developed for a successful integration of ICT in teaching, the model consists of four (4) elements for a successful ICT integration, these are: Basic Knowledge and Skills, Technical Knowledge and Skills, Hardware and Software Availability and Knowledge and Skills Application. These four (4) elements can be realized if these will be supported with the four (4) themes, namely: Curriculum and Instruction, In –service Trainings, Administrative Support and Lifelong Learning. In this study it was recommended that aside from basic knowledge about ICT, technical aspects should be emphasized in instruction. Provision of additional ICT resources that includes software and hardware should be given priority by the administration. In-service training should also be provided to students that will be conducted by experts of ICT from other agency. It is recommended that the administration will strongly support the instructional aspects in terms of ICT.

Keywords: Information and Communication Technology, Barriers to Successful Integration, Pre-Service Teachers.

INTRODUCTION

ICTs (Information and Communication Technologies) are a world-wide phenomenon. In both rich and developing countries, the use of ICTs has a significant impact on teaching and learning in higher education. ICT has the ability to change the character of education by transforming where and how learning occurs, as well as the roles of students and teachers in the learning process.

Teachers are critical to the successful and effective integration of ICT in the classroom. Most students may not be able to take use of all of the potential benefits of ICT on their own if professors are not involved. Pre-service and in-service teachers must take an active role in incorporating ICT into education. Many studies have stressed that integrating Information and Communication Technology into the teaching and learning process is a lifetime process that involves a lot of resources and is dependent on each individual teacher, and that these barriers and challenges will be encountered.

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Several authors, including Hargreaves (1994), Ringstaff (1995), Murray and Campbell (2000), Billowes (1999), and others, have examined the integration of information technologies into the educational system. It was emphasized that integrating information and communication technologies into teaching and learning is a long process that involves a lot of resources and is dependent on each individual instructor, causing a variety of barriers and difficulties.

According to Bingimlas (2009), integrating ICT into the teaching and learning process is critical for students to learn how to operate in the information age. Bingimlas (2009) did a study on the challenges to using ICT in education, which aides educators in overcoming these barriers and becoming successful technology adopters in the future. Teachers had a tremendous desire to integrate ICT into education, according to the findings of his study, but they faced numerous obstacles. Lack of confidence, expertise, and access to resources were the most significant obstacles.Since technology integration in schools has been discovered to be dependent on confidence, competency, and accessibility. In the same survey, it was discovered that teachers require ICT resources, such as software and hardware, as well as effective professional development, adequate time, and technical support. According to Bingimlas (2009), as stated in Mathevula, M. Uwizeyimana& D. Uwizeyimana (2014), the act of integrating ICT into teaching and learning is a complex process that may confront a number of challenges. Lack of teacher confidence, lack of teacher competency, lack of effective training, resistance to change and negative attitudes, lack of technical assistance, and lack of infrastructure are among the frequent hurdles to successful ICT integration, according to literature (Korte&Hüsing, 2007).

Mumtaz (2006) found a number of factors that influence teachers' decision to use ICT in the classroom in his article on the literature associated with practicing teachers' uptake of information and communication technology: access to resources, quality of software and hardware, ease of use, incentives to change, support and collegiality in their school, school and national policies, commitment to professional learning, and background in formal computing.

According to Agyei&Voogt's (2011) study on the use of ICT in the teaching of Mathematics by pre-service teachers in Ghana, one of the major perceived barriers is a lack of knowledge about how to integrate ICT in lessons and a lack of training opportunities for ICT integration knowledge acquisition. Some of these barriers were also surmounted in the study, which looked into the possibility of a professional development structure for pre-service mathematics teachers.From a student's perspective, Whelan (2008) noted other constraints such as technical skills that limit access to ICT in the classroom, a lack of academic advisors and timely feedback from instructors, and reduced connection with classmates and instructors.

The purpose of this study is to determine the barriers to the successful integration of ICT in teaching. Although there are number of studies conducted on the problems, issues, challenges and barriers to successful integration of ICT in teaching. The current study is carried out at the Pre-Service Teachers of Biliran Province State University their experience on integrating ICT in teaching.

OBJECTIVES OF THE STUDY

This study aimed to determine the barriers to the Successful Integration of Information and Communication Technology in Teaching Encountered by Bachelor of Elementary Education (BEEd) and Bachelor of Secondary Education (BSEd) Pre-service teachers of Biliran Province State University, Naval, Biliran Philippines. Specifically, it sought to:

1) Determine the profile of Bachelor of Elementary Education (BEED) Pre-Service Teachers of Biliran Province State University in terms of gender; age; program; and specialization;
2) Determine the barriers to the successful integration of Information and Communication Technology in teaching encountered BEEd Pre-service Teachers;
3) Determine the profile of Bachelor of Secondary Education (BSEd) Pre-Service Teachers of Biliran Province State University in terms of gender; age; program; and specialization;
4) Determine the barriers to the successful integration of Information and Communication Technology in teaching encountered by BSEd Pre-service Teachers; and,
5) Evolve a framework to a successful integration of Information and Communication Technology (ICT) in teaching.

FRAMEWORKS OF THE STUDY

Theoretical framework

Diffusion of Innovation Theory Diffusion can be defined as a "process that communicates an innovation through specific channels among the members of a social system." New innovations adoption process usually begins with a tiny number of innovators according to Rogers' Theory of Diffusion of Innovation (Robinson, 2009; Rogers, 2003).

A population can be broken down into five different segments, based on their propensity to adopt a specific innovation: Innovators, early adopters, early majorities, late majorities and laggards. The adoption as decision process requires the potential adopter collect information regarding the technology, examine the technology, and consider whether it provides sufficient improvement to deserve the investment of energy and time that is needed to add it to his/her range of skills (Rogers, 2003). Therefore, people tend to explore the new technology, and experience how effectively it would work in their activities before accepting or rejecting those technologies (Rogers, 2003). This theory tries to explain how an innovation, which may be about an idea, behavior, or object, is adopted among population. Diffusion of Innovations Theory offers valuable insights into the process of social change (Robinson, 2009) as the main qualities that provide a successful spread of an innovation. These include the significance of peer-to-peer conversations along with peer networks and the understanding the needs of different user segments.

Spreading of new innovation can be achieved through considering five qualities related to the innovation from the perspective of the innovators; based on Rogers, (2003), these five qualities are: *Relative advantage:* The greater the realized relative merit of an innovation, the more quick its rate of adoption is likely to be; *Compatibility:* It refers to the degree to which an innovation is perceived as being consistent with the values, past experiences, and the needs of possible adopters; *Simplicity and ease of use:* New ideas that are simpler to understand for the potential adopter are adopted more rapidly than innovations that require the adopter to develop new skills and understandings. *Trialability:* It refers to the degree to which an innovation can be experimented with on a limited basis; and *Observable results:* The easier it is for individuals to see the results of an innovation, the more likely they are to adopt it.

***Conceptual framework*.**

Different variables will be considered in the conceptualization of this study. The dependent variables covered the profile of the pre-service teachers of BIPSU-College of Education during the second semester of SY 2018-2019 in terms of gender, age, program of study and specialization. The independent variable, however, reflected the barriers to successful integration of information and communication technology in teaching.

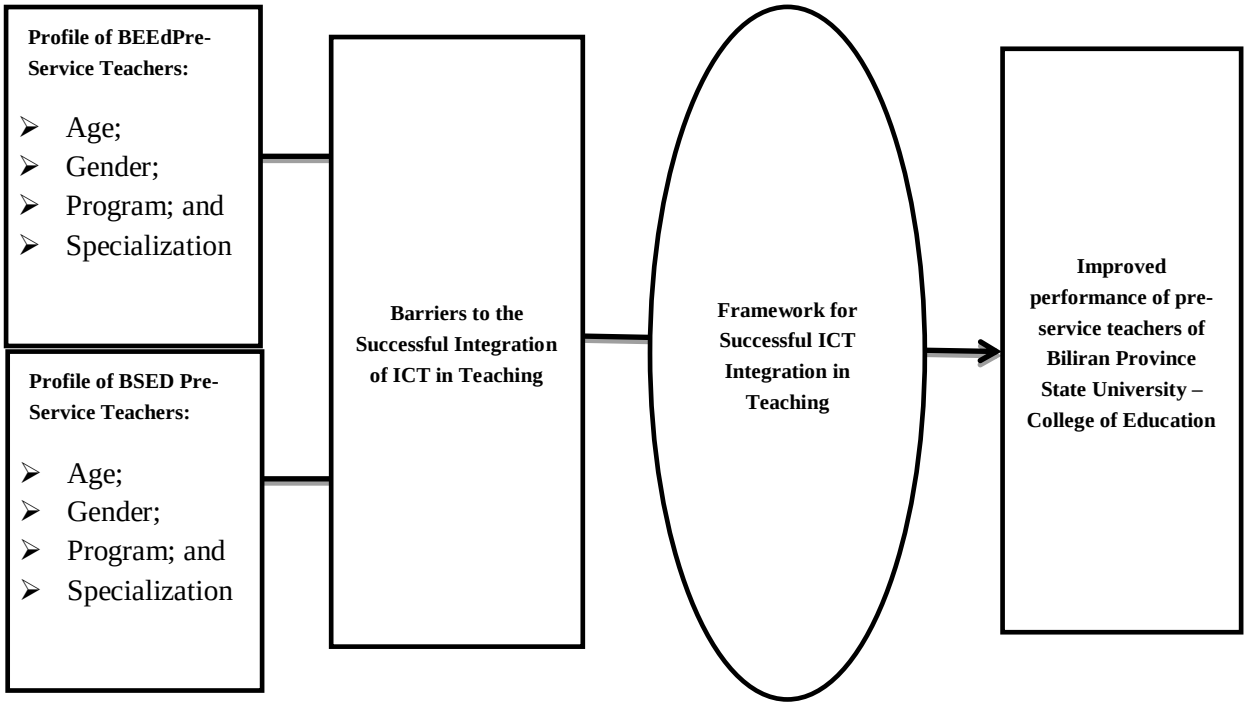


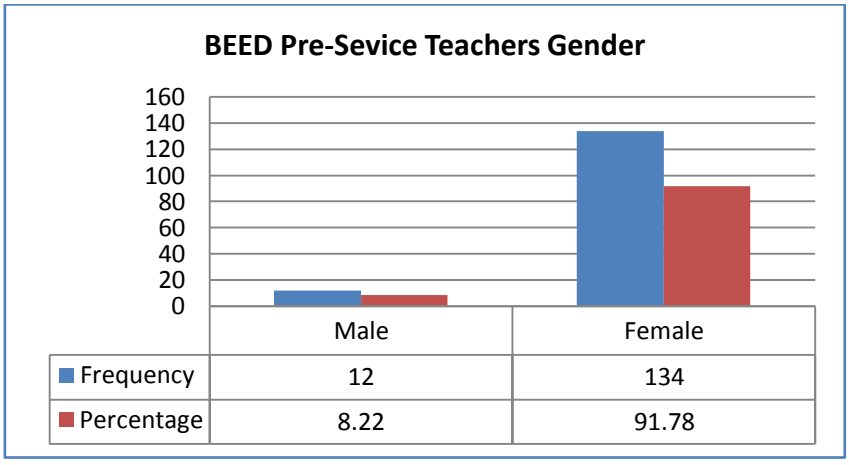
Figure1. *The Conceptual Framework of the Study*

METHODOLOGY

The Descriptive research design was used in this study. This design is considered appropriate for this study because the attainment of the objectives and the presentation and possible findings or results were analysed through descriptions. The study was conducted in Biliran Province State University - College of Education's cooperating schools where the pre-service teachers were assigned during second semester of school year 2018-2019 for their student teaching. The pre-service teachers of Biliran Province State University-College of Education during the second semester of school year 2015-2016 were the respondents of this study. They were the involved respondents in order to provide the necessary data to attain the objectives of this study. In computing the total number of respondents, it made use of the Slovin's Formula with 5% margin of error that resulted to 146 respondents for the BEED program out of 231 pre-service teachers of BEED and 83 respondents for the BSED program out of 106 pre-service teachers of BSED. Summary statistics such as frequency counts, percentages, cross tabulation and descriptive measures such as mean were generated using descriptive statistics.

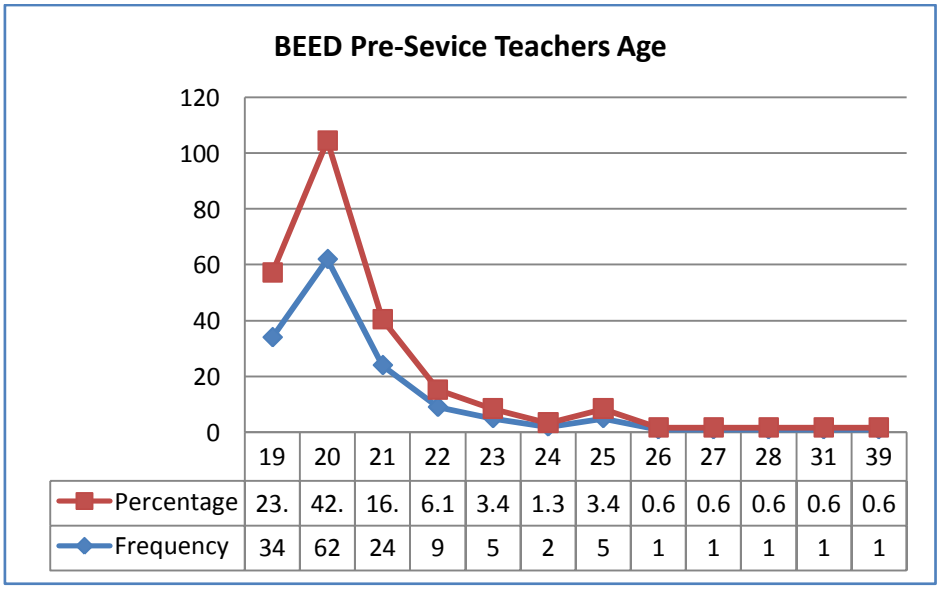
RESULTS AND DISCUSSIONS

Objective 1: ***Profile of the BEED Pre-Service Teachers***



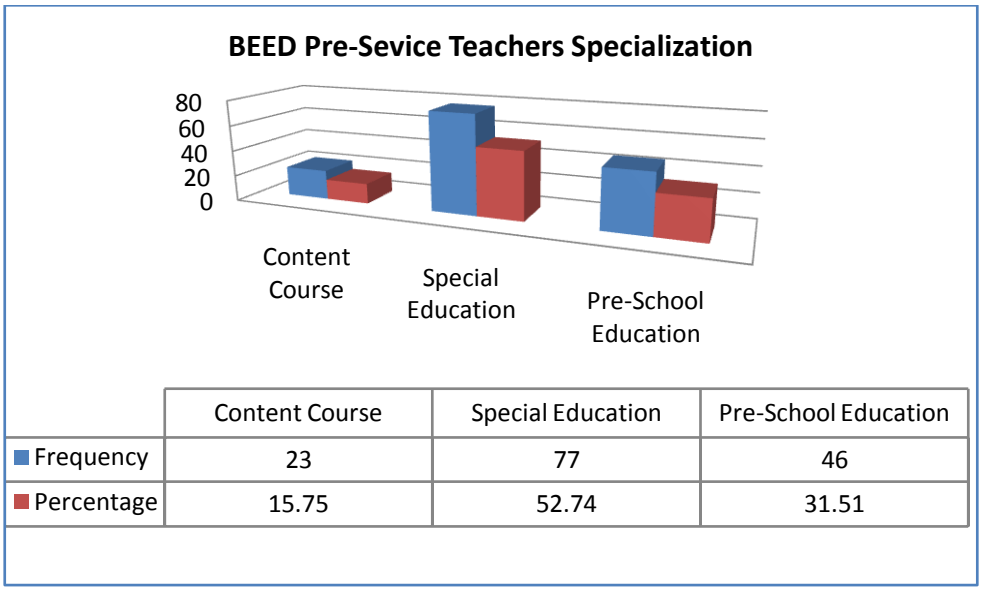
Graph 1. Gender of BEED Pre Service Teachers

As shown in the Graph 1, there were more than female BEED pre-service teachers with 91.78 percent while 8.22 percent were male. Results revealed that that there were more female pre-service teachers than that of male pre-service teachers in the BEED program.



Graph 2: Age BEED Pre-Service Teachers

As presented in Graph 2, 34 or 23.29 percent of the BEED pre-service teachers belonged to the age bracket of 19, 62 or 42.47 percent were under the age bracket of 20, 24 or 16.44 percent fell under 21 age bracket, 9 or 6.16 percent were under the age bracket 22, 5 or 3.42 percent belonged to the age bracket of 23 and 25, 1 or 0.68 percent were under the age bracket of 26, 27, 28, 31 and 39.



	Content Course	Special Education	Pre-School Education
Frequency	23	77	46
Percentage	15.75	52.74	31.51

Graph 3: Specialization of BEED Pre Service Teachers

Specialization. As shown in the Graph 3, 23 or 15.75 percent of BEED pre-service teachers specialized Content Course, 77 or 52.74 percent took Special Education and 46 or 31.51 percent specialized Pre-School Education. This implies that the there is more opportunity to be employed if you are taking SPED as specialization compared to that of Content Course specialization in the BEED program because they teach grades one to six aside from their specialization, however, for those specializing content course can only teach grades one to six unless they will take eighteen (18) units in SPED and Pre-school specializations.

Objectives 2: Barriers to Successful Integration of ICT in teaching encountered by BEED Pre-Service Teachers.

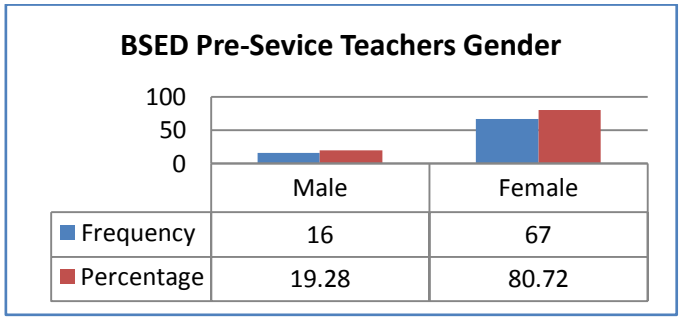
The barriers to the successful integration of ICT in teaching that the BEED pre-service teachers encountered during their student teaching in their respective cooperating school were determined.

Barriers Encountered	WM	Description
Lack of in-service training about ICT.	3.74	Agree
Lack of technical support.	3.82	Agree
Lack of hardware (Computer, printer etc.).	3.77	Agree
Lack of basic knowledge and skills about ICT.	3.36	Neutral
Inadequate repertoire of knowledge and skills on the integration of ICT in instruction.	3.52	Neutral
Lack of appropriate software and materials for instruction.	3.69	Neutral
Lack of physical environment for integrating ICT in classroom.	3.63	Neutral
Inappropriate course content and instructional programs.	3.47	Neutral
The constraints related to hardware (i.e. incompatibility with software, insufficient memory).	3.51	Neutral
Lack of time for integrating ICT in classroom.	3.58	Neutral
Total weighted Average	**3.61**	**Neutral**

As revealed in table, 3.82 weighted mean or described as agree on the barrier "Lack of technical support while 3.36 described as neutral on the barrier "Lack of basic knowledge and skill about ICT. This shows that BEED pre-service teachers lack the knowledge in terms of technical issues in integrating ICT in teaching; on the other hand, they have knowledge on the basic of ICT. It implies that the BEED Pre-service teachers lack the knowledge of the technical aspects of ICT. Technical support is very important specially if there are failures on the ICT, for you to be able to fix the problem and will not affect the effectiveness of your teaching. Means and Olson (1995,) assert that easily accessible technical support (maintenance of computer hardware and intranet infrastructure) is an important factor in the school change, integrating constructivist education and information and communication technologies at school. The authors remark that teachers will have no intention to use technologies if they feel they can encounter technical problems (not working software, hardware problems etc.) that can only be repaired in several days.

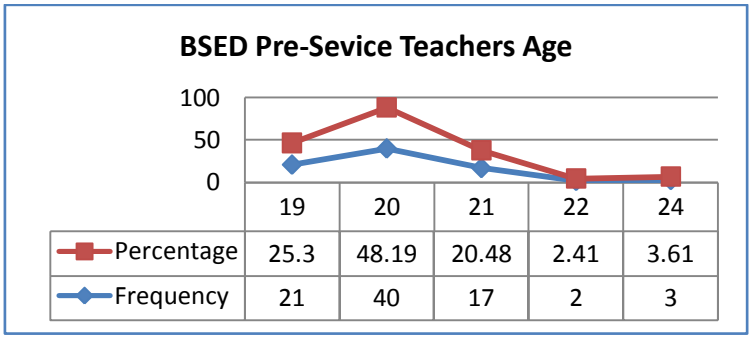
*Objective 3:**Profile of the BSED Pre-Service Teachers***

The profile of the BSED Pre-Service teachers in terms of gender, age and specialization were determined.



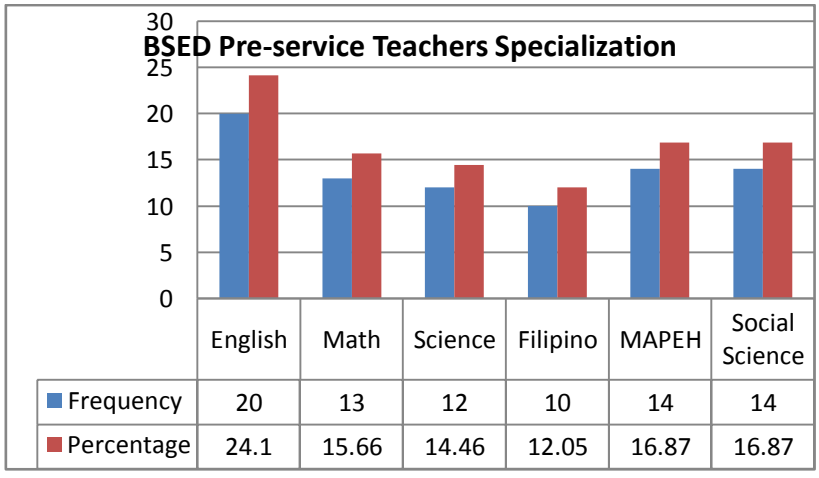
Graph 4: Gender of the BSED Pre-Service Teachers

As shown in the Graph 4, there were more than female BSED pre-service teachers with 80.72 percent while 19.26 percent were male. Results revealed that that there were more female pre-service teachers than that of male pre-service teachers in the BSED program.



Graph 5: Age of the BSED Pre-Service Teachers

As presented in Graph 5, 21 or 25.3 percent of the BSED pre-service teachers belonged to the age bracket of 19, 40 or 48.19 percent were under the age bracket of 20, 17 or 20.48 percent fell under 21 age bracket, 2 or 2.41 percent were under the age bracket 22 and 3 or 3.61 percent belonged to the age bracket of 24.



Graph 6: Specialization of the BSED Pre-Service Teachers

As shown in the Graph 6, 20 or 24.1 percent took up English as their specialization, 13 or 15.66 percent specialized Mathematics, 12 or 14.46 percent specialized Science, 10 or 12.05 percent took up Filipino, 14 or 16.87 percent specialized MAPEH, and Social Science. It could be noted that English specialization has highest numbers of BSED pre-service teachers and the least number specialized Filipino. This implies that in the the pre-service teachers had choose their specialization based on the results of previous board examinations for teachers, wherein there are more passers in English specialization compare to that of other specializations like Filipino.

Objective 4: Barriers to Successful Integration of ICT in teaching encountered by BSED Pre-Service Teachers.

The barriers to the successful integration of ICT in teaching that the BEED pre-service teachers encountered during their student teaching in their respective cooperating school were determined.

Barriers Encountered	WM	Description
Lack of in-service training about ICT	4.2	Agree
Lack of technical support	4.24	Agree
Lack of hardware (Computer, printer, etc.)	4.22	Agree
Lack of basic knowledge and skills about ICT	3.66	Neutral
Inadequate repertoire of knowledge and skills on the integration of ICT in instruction	3.67	Neutral
Lack of appropriate software and materials for instruction	4.02	Agree
Lack of physical environment for integrating ICT in classroom	4.06	Agree
Inappropriate course content and instructional programs	3.93	Agree
The constraints related to hardware (i.e. incompatibility with software, insufficient memory)	3.81	Agree
Lack of time for integrating ICT in classroom	3.81	Agree
Total weighted Average	**3.962**	**Agree**

As depicted in table 3, the barriers; "Lack of in-service training", "lack of technical support", and "lack of hardware (computer, printer, etc.)" were among the identified barriers with the highest weighted mean of 4.2, 4.24 and 4.22 respectively or described as agree on the while 3.66 described as neutral on the barrier "Lack of basic knowledge and skill about ICT. This shows that BSED pre-service teachers had encountered this barriers, which means they have lack training and technical supports that includes insufficiency of hardware. On the other hand the BSEd Pre-service teachers as shown in the table, knowledge and skills about ICT is not consider as barriers in integrating ICT in teaching.

Based on the results it could be noted now that the BEED and BSED pre-service teachers of Biliran Province State University-College of Education, has the same barriers encountered to the successful integration of information and communication technology in teaching. "Lack of in-service training", "lack of technical support", and "lack of hardware (computer, printer, etc.)" were among the identified barriers that hinders the successful integration of ICT in teaching. It could be noted also that the BEED and BSED pre-service teachers had the same results that the barrier "lack of basic knowledge and skills about ICT" were the least barrier to the successful integration of ICT in teaching, this implies that both BEED and BSED pre-service teachers of Biliran ProvinceState University-College of Education had a basic knowledge and skills about ICT, and they learned this from their computer subjects while they were still in first year.

Objective 5: Proposed Framework to Solve the Barriers to the Successful integration of ICT in teaching Encountered by Pre-service Teachers'

Another important objective of this study is to evolve a model that will solve the barriers encountered by the pre-service teachers in integrating ICT in teaching.

This proposed framework will be name as "Successful ICT Integration in Teaching Framework". The framework was developed based on the general objective of the present study which is to determine the barriers to the successful integration of ICT in teaching that the pre-service teachers of Biliran ProvinceState University, encountered during their student teaching in their respective cooperating schools. . This is presented in Figure 2.

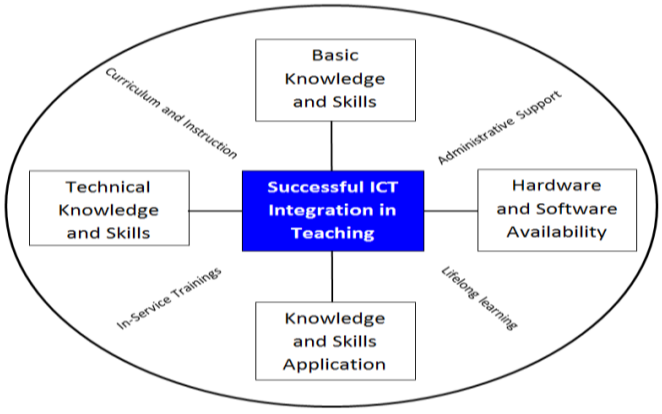


Figure 2: Proposed Framework for a Successful ICT Integration in Teaching

The proposed framework for successful ICT Integration in teaching as depicted in Figure 2, consist of four (4) elements for a successful ICT integration, these are Basic Knowledge and Skills, Technical Knowledge and Skills, Hardware and Software Availability and Knowledge and Skills Application. These four (4) elements can be realized if these will be supported with the four (4) themes, namely; Curriculum and Instruction, In –service Trainings, Administrative Support and Lifelong Learning.

Basic Knowledge and Skills. This element is very important, because this is where students learned the basic of Information and Communication Technology (ICT). The knowledge and Skills learned from this element will serve a foundation to other elements in the framework.

Technical Knowledge and Skills. This element in the framework plays a vital role in a successful integration of ICT in teaching. These include technical proficiency and the provision of both technical infrastructure and technical support for ICT integration throughout the curriculum. In this element student are expected to be proficient in the technical aspects of information and communication technology, which is necessary in integrated in the teaching and learning process.

Hardware and Software Availability. This refers to the provision of needed hardware and software that can be utilized in teaching. This element also plays an important part for a successful integration of ICT in teaching, because with the provision of hardware and software, there is equipment that can be used where the students can apply their knowledge and skills.

Knowledge and Skills Application. This refers to application of knowledge and skills learned from the different elements in the framework. Also in this element it require the instructors and students to apply ICT in their respective disciplines to support and extend teaching and learning and to enhance the knowledge and skills on ICT integration.

These core elements in the framework are critical for the successful integration of information and communication technology in teaching. They can be achieve and realized with the four (4) supportive themes; "Curriculum and Instruction:, "In–service Trainings", "Administrative Support" and "Lifelong Learning". The four core elements in the framework should be based on the curriculum standards and other standards on the use of ICT in teaching, and these could be supported with instructions from competent instructors who can deliver and impart knowledge and skills to students required in integrating ICT in teaching. The frameworks suggest an In-service training, as one of the supportive themes, this means that aside from the knowledge and skills learned by the students from the instructors, there should be an in-service training from other experts or agency. Lifelong Learning as one of the supportive themes, this means that competencies on ICT are developed through a long term process, meaning these require the instructors to enhance/upgrade knowledge and skills in order to impart knowledge to students that are current and relevant in a real time. On the part of the students, they will learn the current and what is presently used, and require them to enhanced and upgrade their learning about new technologies. And the last supportive theme is Administrative Support, this is essential for a successful ICT integration. The administration must support all elements in the framework and address the ICT concern of instructors and students. In the last supportive theme, it requires the administration to provide the ICT infrastructure required or needed by the instructional staff and students.

CONCLUSION

Based on the findings, the following conclusions were drawn; results indicated that both Bachelor of Elementary Education (BEED) and Bachelor of Secondary Education (BSED) pre-service teachers identified "Lack of in-service training", "Lack of technical support", and "Lack of hardware (computer, printer, etc.) with highest mean as barriers to successful integration of information and communication technology in teaching and knowledge and skills about ICT is were determined as the lowest in mean and interpreted as neutral as barriers in integrating ICT in teaching. Therefore, it could be noted from the results that there is a need for the students to have in-service training, technical support should also be provided and provision of hardware which will be utilized by instructors and students. As to the profile of the pre-service teachers, results indicated that there were more female than male pre-service teachers in both program the BEED and BSED. As to the age of the pre-service teachers, most of them are on the age bracket of 20 in both BEED and BSED programs. As to specialization, there were more pre-service teachers took up Special Education as their specialization in the BEED program and in the BSED program there were more who specialized English and Filipino is the least specialized by pre-service teachers.
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RECOMMENDATION

The following are the recommendations based on the results of the study: The instructors teaching ICT subjects should give more emphasis on technical aspects on ICT tools or resources and should teach the students the basic troubleshooting of ICTs. The university should prioritize the provision of additional computers, hardware and software, and other ICT resources or instructional technologies that will be used for ICT subject instruction. The university should provide Educational Technology Laboratory for the NSU-College of Education students which will be used for application of knowledge and skills on ICT integration in teaching. It is recommended that the administration should strongly support the instructional aspects in terms of ICT. The university/college should provide/conduct in-service trainings to students related to ICT and its technical aspects which will be conducted by experts from other agency. It is highly recommended that the framework developed in this study should be the bases in the instructional delivery and provisions of needed ICT hardware and software.

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