Pre-Service Teachers' Perception of and Technology Competency at Creating and Using E-Picture Books

Yong Joon Park[1] & Youjin Yang[2]

[1] Bayh College of Education, Indiana State University, Terre Haute, IN, USA

[2] Education Department, St. Mary-of-the-Woods College, St Mary of the Woods, IN, USA

Correspondence: Yong Joon Park, Department of Early, Elementary, and Special Education, Indiana State University, Terre Haute, IN 47809, USA. Tel: 1-812-237-7892. E-mail: ypark4@indstate.edu

Abstract

This study investigated pre-service teachers' perception of and technology competency in creating and using e-picture books in their future classrooms. Participants were 114 pre-service teachers in a required Early Childhood Education undergraduate course at a mid-western university in the United States. As part of the course assignments, participants created an e-picture book using PowerPoint and participated in an online survey through Qualtrics. The questionnaire consisted of three parts with questions about the teachers' perspectives on technology use, the teachers' recognition of technology competency, and their beliefs about e-picture book use for their teaching career. The collected quantitative data were analyzed through the analysis software provided by Qualtrics and qualitative data were analyzed according to coding methods suggested by Huberman and Miles (1994). Findings implied that instruction in creating e-picture books using PowerPoint may help pre-service teachers understand the necessity of technology-supported material and technology-supported intervention in emergent literacy. These results can be used to further improve teacher education and to activate technology-supported emergent literacy education. Suggestions for future research are discussed.

Keywords: e-picture book, literacy education, pre-service teachers, perception, technology competency

1. Introduction

According to the U.S. Common Core State Standards for English language arts and literacy, "college students should use technology and digital media strategically and capably. For instance, they can be familiar with the strengths and limitations of various technological tools and mediums and can select and use those best suited to their communication goals" (Common Core State Standards Initiative, 2010, p. 7). Many educators have focused on the topic of how to use current technology-based content and devices in improving the effectiveness of education meaningfully and appropriately. Incorporating technology in educational settings has been widely regarded as a typical trend in education worldwide (Organization for Economic Cooperation and Development [OECD], 2010). The e-content service provider "ebrary" conducted an on-line survey of 6,500 college students around the world about their perceptions and usage of e-books (Wagner, 2008). The results show that the majority of participants currently use electronic resources as much as print books, very often use electronic versions of books, and view instruction in information literacy as very important. More recently, researchers have found that using a variety of technology devices and computer programs in teacher education programs could influence pre-service teachers' competency and fluency in technology use (Angeli, 2005; Goktas & Demirel, 2012; Şendağ, 2010; Yeh & Cheng, 2010). However, many other studies have indicated that using technology in instruction will be valuable only when teachers believe it is valuable (Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010). In order to prepare pre-service teachers appropriately in today's teacher education programs, it is important to understand their perceptions and competency level of using computer technology.

The National Council for the Accreditation of Teacher Education ([NCATE], 2008) defined Unit Standards for education faculty members' technology use. The relevant standards for this study are: teaching by professional education faculty integrates diversity and technology throughout coursework, field experiences, and clinical practices (standard 5) and pre-service teachers should have access to exemplary library, curricular, and electronic information resources that serve not only the unit but also a broader constituency (Standard 6). These standards

make it important for education faculty members to integrate technology into college class activities or assignments. This study investigated per-service teachers' perception of and technology competency in creating and using e-picture books in their future classrooms.

2. Background

2.1 The Effectiveness of Technology-Supported Intervention

Several empirical studies show that a technology-supported intervention fostered the development of emergent literacy for young children. For instance, Karemaker, Pitchford, and O'Malley (2010) found that a technology-supported intervention using the whole-word multimedia software Oxford Reading Tree for Clicker (ORT) helped 17 struggling beginner readers (i.e., five- and six-year-old children) achieve all of the literacy measures including significantly greater gains of written word recognition and enjoyment of instruction compared to a reading intervention using traditional ORT Big Books. McKenney and Voogt (2009) described how an intervention using the software PictoPal improved four- and five-year-old children's engagement with literacy concepts and had positive effects on the children's early literacy learning. Segers and Verhoeven (2002) described the development of a child-friendly computer software program to enhance the early literacy skills of kindergarteners in the Netherlands. Children who used the software gained significantly more vocabulary than children who did not use the software after the process. These studies show that technology-supported interventions are effective for young children's learning in early literacy. In teacher education programs, education faculty members need to provide pre-service teachers a chance to learn how to implement technology-supported interventions for emergent literacy but also need to consider their diverse technology competency. E-books or e-picture books can be important materials or resources in literacy education.

2.2 The Effectiveness of Using Technology-Based E-Books or E-Picture Books

Several empirical studies have indicated that using technology-based e-books or e-picture books is effective in promoting aspects of young children's emergent literacy such as the concept of print and phonemic awareness in preschools and primary grade classrooms. Shamir and Shlafer (2011) compared the effect of an educational e-book on Phonological Awareness (PA) and Concept About Print (CAP) among 136 pre-school-aged children at risk for learning disabilities (ALD) and typically developing children (TD). They found improved performance by both groups, but especially for ALD children in the area of CAP. Korat (2010) examined the effect of reading an electronic storybook (e-book) on Israeli children's language and literacy in kindergarten children (N = 40; age 5:2–6:3) compared to first graders (N = 50; age 6:3–7:4) and found that the children who read the e-book exhibited significant progress in word meaning and word reading compared to the control group who followed the regular school program. Korat and Shamir (2008) studied the effects of an educational e-book on 149 five- to six-year-old kindergarteners' emergent literacy levels in low SES (79 children) and middle SES (70 children) groups and found that children from both groups improved in their understanding of word meaning following the educational e-book activity. Shamir, Korat, and Barbi (2008) investigated the effects of a highly rated commercial e-book for young children on 110 kindergarteners' emergent literacy skills in the context of paired peer versus individual use of the e-book. The overall improvement in the measured emergent literacy skills from pre- to post-intervention of the children in the experimental groups was higher than that of the children in the control group.

2.3 Purpose of the Study

There are several empirical studies of the effectiveness of technology-supported intervention or using technology-based e-books or e-picture books for children in classroom settings and many studies of teachers' or pre-service teachers' various perspectives of technology use and technology competency of using technology devices or computer software in higher education (Alper, 2012; Angeli, 2005; Chien, Chang, Yeh, & Chang, 2012; Ching & Ching, 2012; Goktas & Demirel, 2012; Kim, Kim, Lee, Spector, & DeMeester, 2013; Martinovic & Zhang, 2012; Meneses, Fàbregues, Rodríguez-Gómez, & Ion, 2012; Ng, 2012; Ottenbreit-Leftwich, Brush, Strycker, Gronseth, & Roman,et al., 2012; Sánchez, Marcos, González, & Lin, 2012; Yalcin, Yalcin, Sagirli, Yalcin, & Koc, 2011). However there are not many studies of pre-service teachers' creating and using e-picture books in their future teaching practice.

In spite of young children's increasing access to electronic books and the evidence indicating the effectiveness of technology-supported intervention and electronic books' effectiveness for promoting emergent literacy, there are not many specific studies of pre-service teachers' perspectives on and technology competency in designing and producing an e-picture book as an exercise in understanding the necessity of technology-supported material and technology-supported intervention in education. The main purpose of this study is to investigate what pre-service teachers think about technology use and their competency in creating and using e-picture books in their future

teaching practice. The following two research questions were investigated in this study:

1)   What are pre-service teachers' perspectives regarding technology use (i.e., using e-picture book) in their future teaching practice?

2)   What do pre-service teachers think of their competency in creating e-picture books?

3. Method

3.1 Sample and Site

The participants for this study were 114 pre-service teachers enrolled in a pedagogy course at a college of education located in a Midwestern region of the U.S.A. In this group, 87% of the pre-service teachers were female and 13% were male, with 95% White, 3% Black, and 2% Asian/Pacific Islanders. Five percent were freshmen, 39% sophomores, and 56% juniors, with dual majors such as elementary education and special education majors (39%), elementary education majors only (22%), elementary education majors with reading minors (21%), elementary education majors with early childhood minors (8%), and human development majors (8%). Subjects completed the e-survey voluntarily and individually.

3.2 Research Design & Research Procedures

The case study (Creswell, 2003; Creswell, Plano-Clark, Gutmann, & Hanson, 2003) was applied for this study. In this study, an online survey was administered using the service Qualtrics. As both qualitative and quantitative data were collected using the online survey, the results of both quantitative and qualitative data from the survey were summarized and discussed below.

During the three-week-long intervention of this study, in class, one of the authors provided the participant pre-service teachers with information about the state and national standards of literacy education, a variety of examples of e-picture books made using PowerPoint or Flash and traditional paper picture books for kindergartners, and sample literacy lesson plans using picture books and other materials for kindergartners. Each pre-service teacher then designed and produced his or her own e-picture book (maximum: 15 slides) for kindergartners using PowerPoint.

After the intervention, a Technology Competency Survey developed by the authors was used to learn the pre-service teachers' perceptions of and technology competency in creating and using their e-picture book in their future classrooms. Two experts who have knowledge about technology and emergent literacy as well as early childhood education evaluated the items and the content of the survey. Based on their judgment, the authors developed the final survey. Thereafter, the survey was pilot tested on 90 pre-service teachers to determine its reliability level. The reliability analysis revealed a Cronbach's alpha reliability score of 0.90, which showed that the instrument was highly reliable (George & Mallery, 2003). The authors sent the students an e-mail with a link to the online survey. The survey consisted of twelve questions about pre-service teachers' perception of and competency at creating and using e-picture books in their future teaching practice, ranked on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree) one open-ended question. The survey process was voluntary. Participants were asked about their perceptions of technology use in the first section of the survey, about their technology competency of creating and using e-picture books in the second section, and provided with an open-ended question about their opinions or comments of creating and using e-picture books in their future classrooms in the third section. All data were collected electronically and anonymously using Qualtrics.

3.3 Data Analysis

All data were reviewed and analyzed by the two authors separately first and collaboratively later. The collected quantitative data were analyzed using the annalistic option of Qualtrics. The collected qualitative data were analyzed according to coding methods suggested by Huberman and Miles (1994). For instance, the two authors met to discuss our respective coding schemes and any discrepancies. We identified four categories for the pre-service teachers' attitudes toward creating and using e-picture books for their future teaching career: positive, negative, neutral, and other. For this analysis, the two authors separately analyzed the data by hand first and compared their analyses later. The analysis was only accepted if it matched.

4. Results

4.1 Quantitative Results

The outcomes of the quantitative data were summarized in two sections: (1) Pre-service teachers' perspectives of using e-picture books as a teaching tool and (2) Pre-service teachers' technology competency in creating and using e-picture books.

As Table 1 shows, many pre-service teachers think that e-picture books could be a great resource for their future teaching ($M = 4.04$, $SD = 0.89$). Specifically, they think that e-picture books could be a good supplementary tool ($M = 4.06$, $SD = 0.77$) or an important tool to teach literacy ($M = 3.84$, $SD = 0.84$) for their teaching and could be a fun tool for their future students ($M = 4.17$, $SD = 0.77$), especially for early graders such as kindergartners ($M = 4.52$, $SD = 0.82$).

4.2 Pre-Service Teachers' Perspectives of Using E-Picture Books as a Teaching Tool

Table 1. Summary of pre-service teachers' perspectives of using e-picture books as a teaching tool

Statistic	I think that teacher-made e-picture books can be great resources for my teaching.	I think that technology based picture books (e-picture books) can be great resources for teaching literacy to early grades (e.g., kindergarteners).	I think electronic picture books will be one of the important tools for me to teach literacy.	The electronic picture books are a good supplementary tool for my future teaching career.	The electronic picture books are fun for students.
Min Value	1	1	2	2	2
Max Value	5	5	5	5	5
Mean	4.04	4.25	3.84	4.06	4.17
Variance	0.79	0.67	0.70	0.59	0.60
Standard Deviation	0.89	0.82	0.84	0.77	0.77
Total Responses	114	114	114	114	114

The results of survey questions 11 and 12 are related to pre-service teachers' perspectives of technology use and our explanation in the discussion section. Figures 1 and 2 show how many times the pre-service teachers plan to use technology for teaching their students and whether or not they plan to encourage their students to use technology (e.g., creating e-picture book).

Q 11. I rate my frequency of technology use with my future students.

Figure 1 shows that 21% of the 114 participants thought that they would use technology for their future students daily, 41% weekly, 21% monthly, 4% two or four times a year, and 7% seldom or never.
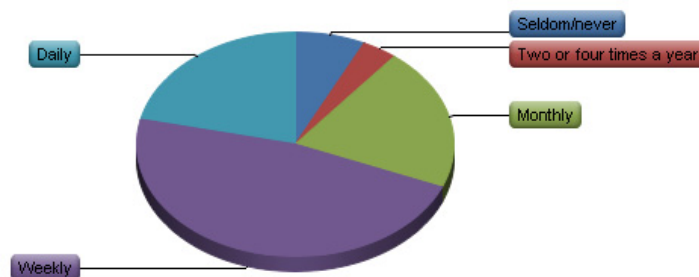

Figure 1. Pre-service teachers' frequency of technology use with their future students

Q 12. My future students are encouraged to construct and produce knowledge beyond the material from teachers and textbooks (i.e., creating their own electronic picture books)

Figure 2 shows that 39% of the 114 participants will encourage their future students to create electronic picture books as a part of class activities monthly, 24% of them will do that two or four times a year, 18% weekly, 12% never or seldom, and 7% daily.
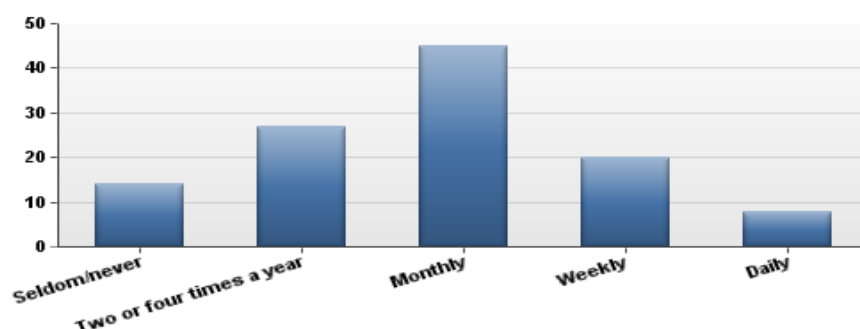
Figure 2. Encouraging future students to learn about how to create their own electronic picture books

4.3 Pre-Service Teachers' Technology Competency about E-Picture Books

As Table 2 shows, the pre-service teachers think that they have the technology competency to evaluate e-picture books and find appropriate e-books for their students (M = 4.12, SD = 0.72) and have an appropriate level of technology skills to use commercial e-picture books published in various formats for their teaching (M = 4.04, SD = 0.88). The pre-service teachers are also interested in taking a workshop or intervention to learn how to create and publish e-picture books themselves (M = 3.89, SD = 0.96). However, their current technology competency to create or design e-picture books is very low (see Figure 3 below).

Table 2. Summary of pre-service teachers' technology competency about e-picture books

Statistic	I have good personal technology skills such as the ability to evaluate and provide developmentally appropriate educational computer resources to students (e.g., electronic picture books).	I have the appropriate level of technology skills to use any educational resources built in a website and/or electronic format (e.g., electronic picture books) .	It will be meaningful if I can take a workshop about how to create and publish e- picture books.
Min Value	2	1	1
Max Value	5	5	5
Mean	4.12	4.04	3.89
Variance	0.52	0.77	0.96
Standard Deviation	0.72	0.88	0.98
Total Responses	114	113	114

The results of survey question 10 are related to pre-service teachers' perspectives of technology use and our explanation in the discussion section.

Q 10. I classify my current ability to design electronic and interactive picture books.

Figure 3 shows that 46% of 114 participants classified their current ability as not yet ready to design electronic and interactive picture books, and 39% considered themselves beginners or able to do it with others' support. Only 13% of participants were confident in their ability, and just 2% thought they could teach others how to use computer software to create e-picture books.
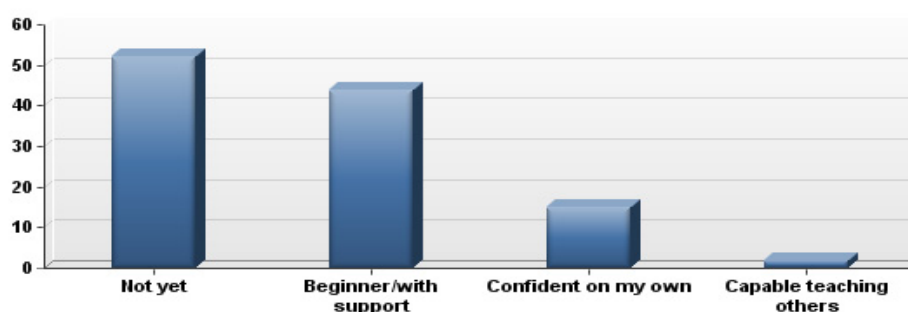
Figure 3. Pre-service teachers' competency of using computer software to create e-picture book

4.4 Qualitative Results

Only 82 out of 114 participants answered the open-ended survey question "Please write about your opinions or comments of using teacher-made electronic picture books as teaching resource." Table 3 shows that many pre-service teachers are very positive about the idea of creating and using e-picture books for their future students (approximately 68% out of 82 participants), some are neutral (19%), a few are negative about it (8%), and a small number were not quite sure how to answer the question (5%). Frequent opinions or comments are also summarized in Table 3; frequent positive, neutral, negative opinions or comments in answer to question 13 are described using pre-service teachers' original answers in this section.

Table 3. The summary of pre-service teachers' opinions or comments of e-picture books

	Positive	Neutral	Negative	Other Comments
N = 82 (100%)	*n* = 54 (about 68%)	*n* = 14 (about 19%)	*n* = 6 (about 8%)	*n* = 4 (about 5%)
Frequent Opinions or Comments	• Positive about using e-picture books for future students	• Positive, but I want to learn more about how to create e-picture books. • Positive, but concerned about the physical setting • Positive, but using traditional paper books is still important • Can be positive or negative based on how it is used by the teacher	• Traditional paper books will work better than e-picture books • Not helping students' learning process	• Do not know much about e-picture books

4.5 Positive Responses

Many pre-service teachers believe that creating and using e-picture books can be a good resource for teaching literacy and can motivate students to be creative and engaged in their learning. They also think that using e-picture books could be a good model of how to use current technology meaningfully for their students. We

selected and added several answers which belong to this category of pre-service teachers' positive of creating and using e-picture books for future students.

- *I think it would be a good source for ELED teachers to use electronic pictures books as a good source of teaching literacy because the books are fun and students can learn through activity. Activities are important for students because it gets them involved in learning and e-books can do that. They would also be able to create their own e-book as a student which would be extremely helpful because it really gets the student involved in literacy and their own learning process.*

- *I think that teacher-made and web-based electronic picture books as teaching resources are great tools that every teacher should try to use in their classroom. Using any kind of technology we can encourage students to continue learning even after they leave the classroom, as well as using electronics to further their knowledge during class time. As a future teacher I believe that we should use everything possible to help make our students learning experience productive and enjoyable which will hopefully let them take away great knowledge!*

- *I think it would be a very good source because teachers would be able to create their own book as to what they want their students to learn. This would be easier than trying to find a book that talked about that specific lesson.*

- *I think it is very important for students to see their own teachers creating and using their own technological materials in the classroom. This will make students more engaged in their own learning and also more excited about the material that will be covered.*

4.6 Neutral Responses

Some pre-service teachers are neutral about creating and using e-picture book because of their lack of knowledge of technology, possibly inappropriate physical setting of using technology in their future classroom, and undecided opinions between using traditional paper book format and electronic format. Many of them are still positive about creating and using e-picture books, but they think that they need more knowledge of technology use to be confident. In addition, pre-service teachers believe that the teacher's judgment about technology use is the most important thing and the effectiveness can vary depending on how the teacher uses it. We selected several answers which belong to five different categories of pre-service teachers' neural opinions of creating and using e-picture books below.

- Positive, but I want to learn more about how to create e-picture books.

  I have created one electronic picture book so far. It was a lot of fun and I think it would be a great tool to use in my classroom in the future.

  I have only seen an electronic book one time, in my ELED 272 class. I would like to see more of them and be taught how to use and create them.

  I am not a technological savvy person though unfortunately. I am not terribly familiar with designing my own picture book on the computer. I am certainly interested in learning the skill though. After learning the skill, I would most certainly be willing to use these kinds of books in my classroom.

- Positive, but concerned about the physical setting

  Using web-based electronic picture books could be a great resource and addition to teaching literacy in the classroom. However, the frequency of use would depend on what the student is capable of and the availability of computers, etc. to the students.

  Positive, but using traditional paper books is still important

  I think that web-based electronic picture books can be a fun thing to use and something different but I don't think I will use them very much in my classroom. Technology is an upcoming source in our world but I think I will stick to the simple picture books and maybe only use a web-based picture book occasionally. I don't think it's important that we have knowledge on how to make our own.

- Can be positive or negative based on how it is used by the teacher

  The electronic based books would be a good tool to use in the class room, but it does have its pros and cons. It will help the child become more skilled at using technology, but I personally would not want them completely dependent on it. Having the physical book in their hands could make a world of difference in their reading. They could go take their book to a favorite spot of theirs and have a special place where they can imagine the story.

4.7 Negative Responses

A few pre-service teachers still prefer the traditional paper book format instead of e-picture books. They do not believe that using e-picture books for their future students is helping the students' learning process. For example, there are two answers below.

- Traditional paper books will work better than e-picture books

  I am old fashioned and I would prefer to use hard copies of picture books. I'm just worried about kids becoming hooked to computers too early.

- Not helping students' learning process

  I believe that electronic picture books might be disruptive to students. Students might not gain as much knowledge from an electronic as they would if someone was reading to them or helping them learn it. Electronic picture books might be entertaining, but they may not teach the student like a hard book can. Though technology is becoming more and more popular, I do not think that young students like kindergarteners should be using computers for books.

4.8 Other Comments

Several pre-service teachers gave other comments on question 13 because they are unfamiliar or unsure about the topic of creating and using e-picture books. For example:

- *Do not know much about e-picture books*

- *I am not familiar with electronic picture books.*

- *I'm not really sure of using electronic picture books at this time.*

5. Discussion and Implications

5.1 Per-Service Teachers' Perspectives about Using E-Picture Books in Their Future Instruction

As the results of pre-service teachers' perspectives showed, many pre-service teachers thought that e-picture books could be a good supplementary tool (M = 4.06, SD = 0.77) or an important tool to teach literacy (M = 3.84, SD = 0.84). In particular, as shown by the results of Q 11 (I rate my frequency of technology use with my future students) and Q 12 (My future students are encouraged to construct and produce knowledge beyond the material from teachers and textbooks (i.e., creating their own electronic picture books)), a majority of pre-service teachers were willing to do technology-based instruction daily and weekly and to often encourage their student to create or design e-picture book with technology use. We could infer that many pre-service teachers would often use technology in their instruction in the future and should have appropriate and meaningful practice manipulating current technology-based content or devices before they become teachers.

Answers to the open-ended question (Please write about your opinions or comments of teacher-made and web-based electronic picture books as teaching resources), were divided into four sections: positive, neutral, negative, or other comments. Fifty-four out of 82 pre-service teachers were very positive about creating and using e-picture books in the future. Fourteen who were neutral were still positive about creating and using e-picture books, but they were not confident about using technology to create e-picture books. In spite of the availability of technology at many schools, many teachers still had many difficulties integrating technology into their teaching practices, as shown in their uncertainty about what technology-enhanced teaching could look like (OECD, 2008). In this study, some of the neutral pre-service teachers showed a similar hesitation. Even four of the participants who belonged to the section, Other Comments, stated that they were not familiar with or unsure of creating and using e-picture books. Six pre-service teachers expressed that creating and using e-picture books would not help students' learning and it could be unnecessary for them to create and use e-picture books in the future. Overall, the results of the qualitative data showed that many pre-service teachers were very positive about creating and using their e-picture books in the future although a few were still negative and preferred the traditional paper book format. The majority of pre-service teachers wanted to learn more about updated technology-based teaching resources such as e-picture books.

5.2 Technology Competency of Designing and Producing E-Picture Books

Pre-service teachers' appropriate practice with technology in a teacher education course could improve their technology skills and technology competency (i.e., use of technology to support teaching strategies and integration of computer activities with appropriate pedagogy in the classroom) more than if they did not practice (Angeli, 2005). In this study, there was an interesting finding about pre-service teachers' technology competency in terms of e-picture books. In spite of the pre-service teachers' high technology competency in appropriately

evaluating, selecting, and using commercial e-picture books, their current competency in creating or designing e-picture books was very low (i.e., only 13% of 114were confident for it and 2% felt they could teach others how to use computer software to create e-picture books). However, they were willing to take a workshop or other educational intervention to learn how to create e-picture books in the future. This implies that pre-service teachers are willing to create e-picture books and improve their technology competency during their teacher education if their program provided them with appropriate practice in how to design, create, and publish e-picture books.

5.3 Conclusion

Based on the outcomes of both quantitative and qualitative data, we concluded that many pre-service teachers were willing to create and use e-picture books in their future teaching practices and that they wanted to learn more about technology-based resources and tools in their course work. This indicates that teacher education programs should provide pre-service teachers the appropriate technology-based resources and practice to let them become creative and confident in using technology such as creating e-picture books. As this study showed, each teacher candidate had his or her own perspectives about technology use and different competency levels in using technology. Considering the limitation (i.e., not diverse treatments with various technology tools) of this study, future studies should focus on the effectiveness of technology intervention such as creating e-picture books and applying the books to kindergarteners and show how offering instruction in creating e-picture books using PowerPoint or other various software could help pre-service teachers understand the usefulness of technology-supported material and technology-supported intervention of emergent literacy.

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