

## **A STUDY OF DIGITAL LITERACY OF STUDENT TEACHERS IN EDUCATION COLLEGES**

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### **Abstract**

The main objective of this study is to study digital literacy of student teachers in Education Colleges. Quantitative and qualitative methods were used in this study. The questionnaire included the demographic information, digital literacy knowledge and digital literacy practices. The reliability coefficient (Cronbach's alpha) of student teachers' digital literacy practices was 0.91. Non - Proportional or Equal-sized Stratified sampling was used to analyze the collect data of 320 student teachers from Mawlamyine Education College and Yankin Education College. In qualitative study, interview was conducted. Out of 320, 12 student teachers were selected as participants in qualitative study. The Statistical Package for Social Science (SPSS) software version 22 was used to analyze the collected data. Item Percent Correct (IPC), Descriptive statistics, Independent Sample *t* Test, One-Way ANOVA and Pearson correlation were used to analyze the data in this study. The levels of digital literacy knowledge of student teachers were found to be at satisfactory. The levels of practices of student teachers' digital literacy was also found to be at satisfactory (Mean= 2.9, SD=0.63). There were statistically significant differences in digital literacy knowledge of student teachers grouped by college, year of study and specialization. Similarly, significant differences were found in student teachers' digital literacy practices in grouped by gender, training and specialization. Pearson correlation was found that student teachers' digital literacy knowledge positively and weakly correlated with digital literacy practices. Qualitative study suggested that student teachers need to do practice their presentations and assignments by using PowerPoint application, communicate other people by using digital tools and know about E-safety.

**Keywords:** digital literacy, student teachers

### **Introduction**

Digital literacy is an essential quality that makes an individual capable of living, learning, working, and participating in a digital society (JISC, 2014). Digital literacy is the ability to find, evaluate, utilize, share, and create content using information technologies and the internet (Murray, 2009). Digital literacy is the ability to make, represent and share meaning in different modes and formats; to create, collaborate and communicate effectively and to understand how and when digital technologies can best be used to support these processes (Hague and Payton, 2010).

### **Significance of the Study**

Around the world, and increasingly in Myanmar, digital technologies are becoming essential to our everyday lives and activities (British Council, 2015). Student teacher should know when and how to use digital tools and other resources to satisfy one's information need, and how to use techniques to find information quickly. Additionally, they should know to evaluate digital information to ensure its quality, currency, relevancy, accuracy, and credibility before creating new information to share with others through different communication channels (Meyers, 2013).

Education must include the skills, knowledge and understanding that will enable them to work successfully with digital technology. Students must now be able to utilize online learning tools and social media platforms. As more and more young people gain access to technology, they will discover new ways to interact with the content that they enjoy. This is yet another reason why schools should focus on defining digital literacy and then figuring out the best way to teach it in

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classrooms. Therefore, the researcher intends to study digital literacy of student teachers in Education Colleges.

### **General Objective**

To study digital literacy of student teachers in Education Colleges

### **Specific Objectives**

1. To investigate the knowledge levels of student teachers concerning digital literacy
2. To investigate the variation of student teachers' knowledge concerning digital literacy according to their personal factors and college they have attended
3. To investigate the levels of practices of student teachers concerning digital literacy
4. To investigate the variation of student teachers' practices concerning digital literacy according to their personal factors and college they have attended
5. To investigate the relationship between student teachers' digital literacy knowledge and practices

### **Research Questions**

1. What are the knowledge levels of student teachers concerning digital literacy?
2. Is there any variation of student teachers' knowledge concerning digital literacy according to their personal factors and college they have attended?
3. What are the levels of practices of student teachers concerning digital literacy?
4. Is there any variation of student teachers' practices concerning digital literacy according to their personal factors and college they have attended?
5. Is there any relationship between student teachers' digital literacy knowledge and practices?

### **Limitations of the Study**

The participants are first year and second year student teachers from Yankin Education College and Mawlamyine Education College. This study designs to develop the digital literacy among student teachers from Education Colleges.

### **Theoretical Framework**

This research work was guided by following theoretical framework. In this study digital literacy was investigated with three dimensions based on Digital Literacy Model (Ng, 2012). These three dimensions are technical, cognitive and social-emotional dimensions.

#### **(1) Technical dimension**

The technical dimension means possessing the technical and operational skills to use ICT for learning and in everyday activities. This dimension involves understanding how to connect and use input and peripheral devices, understanding file structures, knowing how to operate technologies adequately and understanding tabs and their relationships to content. It also includes connecting and using input and peripheral devices.

The technical dimension involves finding, downloading and installing applications and also using mobile devices and digital devices. In addition, this dimension includes setting up and using communication and social networking tools and also updating/changing user account information on the internet and sending email and knowing how to use computer.

## **(2) Cognitive dimension**

The cognitive dimension involves thinking critically in the search, evaluate and create cycle of handling digital information. This dimension includes evaluating and selecting appropriate software programs to learn with or to do a specific task and also finding and analyzing information and creating a new thing. This dimension of digital literacy requires the individual to be knowledgeable with the ethical, moral and legal issues associated with online trading and content reproduction that make use of digitally-based resources. This dimension includes decoding information and multimedia resources and also navigating intelligently through hypermedia environments to construct knowledge. Moreover, this dimension involves synthesizing new understandings using appropriate online or offline tools that will convey the meanings in the best sense.

## **(3) Social-emotional dimension**

The social-emotional dimension involves using the internet responsibly for communicating, socializing and learning. This dimension includes observing 'netiquette' through the application of similar rules as in face-to-face communication such as respect using appropriate language and words to avoid misinterpretation and misunderstanding. This dimension involves protecting individual safety and privacy by keeping personal information as private as possible and not disclosing any more personal information than is necessary and recognize when (s) he is being threatened and knowing how to deal with it for example whether to ignore, report or respond to the threat. This dimension includes studying and learning effectively in technology rich-environments, formal and informal. Moreover, this dimension involves understanding how to communicate media work and share idea and thoughts and also collaborating with others to be successful.

## **Definition of Key Terms**

**Digital literacy:** is the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills (Heitin, 2016).

**Digital tools:** are programs, websites or online resources that can make tasks easier to complete (Department of Health and Social Care, 2012).

## **Operational Definition**

**Digital literacy:** is the ability to use ICT to find, collect, evaluate, create, communicate and share digital information at home, at school, at work and in society. In this study, digital literacy consists of three dimensions such as technical, cognitive and social-emotional dimensions.

## **Methodology**

### **Quantitative methodology**

#### **(i) Sample**

In this study, Student teachers from Mawlamyine Education College and Yankin Education College were included. The target population and sample was selected from 320 student teachers in Mawlamyine Education College and Yankin Education College by non-proportional stratified sampling method.

#### **(ii) Instrumentation**

In this study, we used to investigate student teacher digital literacy knowledge and practices. The questionnaire consists of three parts. The first one was to collect the demographic information regarding gender, age, year of study, specialization, college, the year when the student

teachers started using computer, the year when the student teachers started using mobile phone, the year when the student teachers started using internet, and training experiences. The second was the questionnaire of student teachers' digital literacy knowledge. It consists of totally 28 items: 10 items concerned with student teachers' digital literacy knowledge in technical dimension, 10 items concerned with student teachers' digital literacy knowledge in cognitive dimension and 8 items concerned with student teachers' digital literacy knowledge in social emotional dimension.

The third was the questionnaire of student teachers' digital literacy practices. There are 41 items in student teachers' digital literacy practices: 13 items concerned with student teachers' digital literacy practices in technical dimension, 14 items concerned with student teachers' digital literacy practices in cognitive dimension and 14 items concerned with student teachers' digital literacy practices in social emotional dimension. The student teachers were asked to respond to the questionnaire items through the use of five points Likert-type scale (1= never, 2= seldom, 3= sometimes, 4= often and 5= always).

**Instrument Validity:** The questionnaire was examined by eight experienced teachers from the Department of Educational Theory, Yangon University of Education. The modified instrument was used to find out the reliability in the pilot study. To test the reliability of these questionnaires, the Cronbach's alpha was used.

**Instrument Reliability:** The internal consistency (Cronbach's alpha) of student teachers' digital literacy practices in technical dimension was 0.76. The internal consistency (Cronbach's alpha) of student teachers' digital literacy practices in cognitive dimension was 0.80. The internal consistency (Cronbach's alpha) of student teachers' digital literacy practices in social emotional dimension was 0.87. The internal consistency (Cronbach's alpha) of overall questionnaires was 0.91.

### **(iii) Procedure**

After obtaining the permission from Department of Educational Theory to do research in Mawlamyine Education College and Yankin Education College, the questionnaires were distributed to the 50 student teachers from Thingunyun Education College for a pilot study. In September, 2019, the revised questionnaires were distributed to the 320 student teachers from Mawlamyine Education College and Yankin Education College. The respondent rate was 100%.

### **(iv) Data Analysis**

Descriptive Statistics, Independent Samples *t* test, One-way ANOVA, Post Hoc Tukey HSD and Pearson correlation were used to analyze the data.

## **Qualitative Methodology**

A qualitative study of interview was conducted to collect information about the information concerning digital literacy.

### **(i) Sample**

To obtain the necessary qualitative data, 6 student teachers from Mawlamyine Education College and 6 student teachers Yankin Education College were randomly selected.

### **(ii) Instrumentation**

As an instrument, interview and documentation were used to obtain the require data. Informal conversation was also used to get information for qualitative study.

### **(iii) Procedure**

Interview was held by the researcher about two weeks.

**(iv) Data Analysis**

In qualitative analysis, the interview questionnaires were analyzed to check their content, interpreted and presented in the paper.

**Findings****Quantitative Findings**

Findings for research question (1) are presented in Table 1.

**Table 1 Numbers and Percentages of Student Teachers Showing the Levels of Digital Literacy Knowledge (N=320)**

| Scoring Range | No. of Students | Remark                   |
|---------------|-----------------|--------------------------|
| <50%          | 107 ( 33%)      | Below Satisfactory Level |
| 50%-74%       | 213 ( 67%)      | Satisfactory Level       |
| ≥75%          | 0               | Above Satisfactory Level |

Scoring range: <50%= Below Satisfactory      50%-74% =Satisfactory      ≥75%= Above Satisfactory

Findings for research question (2) are presented in Table 2.

**Table 2 Mean Scores and Standard Deviations of Student Teachers' Digital Literacy Knowledge Grouped by Gender (N=320)**

| Variable                   | Gender | Number of Student Teachers | Mean  | SD   |
|----------------------------|--------|----------------------------|-------|------|
| Digital Literacy Knowledge | Male   | 160                        | 14.97 | 2.99 |
|                            | Female | 160                        | 14.66 | 2.62 |

**Table 3 Mean Scores and Standard Deviations of Student Teachers' Digital Literacy Knowledge Grouped by College (N=320)**

| Variable                   | College   | No. of Student Teachers | Mean  | SD   |
|----------------------------|-----------|-------------------------|-------|------|
| Digital Literacy Knowledge | College A | 160                     | 13.94 | 2.86 |
|                            | College B | 160                     | 15.69 | 2.48 |

**Table 4 Mean Scores and Standard Deviations of Student Teachers' Digital Literacy Knowledge Grouped by Year of Study (N=320)**

| Variable                   | Year of study        | No. of Student Teachers | Mean  | SD   |
|----------------------------|----------------------|-------------------------|-------|------|
| Digital Literacy Knowledge | 1 <sup>st</sup> year | 160                     | 14.27 | 2.71 |
|                            | 2 <sup>nd</sup> year | 160                     | 15.36 | 2.82 |

**Table 5 Mean Scores and Standard Deviations of Student Teachers' Digital Literacy Knowledge Grouped by Training Experiences (N=320)**

| Variable                   | Training Experiences | No. of Student Teachers | Mean  | SD   |
|----------------------------|----------------------|-------------------------|-------|------|
| Digital Literacy Knowledge | Without Training     | 216                     | 14.74 | 2.71 |
|                            | With Training        | 104                     | 14.97 | 3.02 |

**Table 6 Mean Scores and Standard Deviations of Student Teachers' Digital Literacy Knowledge Grouped by Specialization**

| Variable                   | Specialization    | Mean  | SD   |
|----------------------------|-------------------|-------|------|
| Digital Literacy Knowledge | Physics-Bio       | 15.95 | 2.19 |
|                            | Physics-Chemistry | 14.91 | 3.01 |
|                            | Chemistry-Bio     | 14.79 | 3.22 |
|                            | History-Eco       | 14.52 | 2.83 |
|                            | Geography-Eco     | 14.66 | 2.39 |
|                            | Geography-History | 13.94 | 2.93 |

**Table 7 One-way ANOVA Result Showing Student Teachers' Digital Literacy Knowledge Grouped by Specialization.**

| Variable                   |                | Sum of Squares | df  | Mean Square | F     | P     |
|----------------------------|----------------|----------------|-----|-------------|-------|-------|
| Digital Literacy Knowledge | Between Groups | 115.464        | 5   | 23.093      | 3.010 | .011* |
|                            | Within Groups  | 2408.658       | 314 | 7.671       |       |       |
|                            | Total          | 2524.122       | 319 |             |       |       |

\*p&lt;.05

**Table 8 Tukey HSD Result Showing Student Teachers' Digital Literacy Knowledge Grouped by Specialization**

| Variable                   | (I)Specialization | (J)Specialization | Mean Difference | P      |
|----------------------------|-------------------|-------------------|-----------------|--------|
| Digital Literacy Practices | Physics-Bio       | Geography-History | 2.00            | .004** |

\*\*p&lt;.001

Findings for research question (3) are presented in Table 3.

**Table 9 Mean Values and Standard Deviations of Student Teachers' Digital Literacy Practices**

| No. | Variable                   | Mean       | SD          |
|-----|----------------------------|------------|-------------|
| 1   | Technical Dimension        | 2.83       | 0.71        |
| 2   | Cognitive Dimension        | 2.66       | 0.72        |
| 3   | Social-Emotional Dimension | 3.23       | 0.80        |
|     | <b>Average</b>             | <b>2.9</b> | <b>0.63</b> |

**Scoring Direction:** 1.00-1.80=Never 1.81-2.60=Seldom 2.61-3.40=Sometimes  
3.41-4.20=Often 4.21-5.00=Always

**Remark:** 1-2.33= Below Satisfactory 2.34-3.67= Satisfactory 3.67-5.00= Above Satisfactory

Findings for research question (4) are presented in Table 4.

**Table 10 Mean Values and Standard Deviations of Student Teachers' Digital Literacy Practices Grouped by Gender**

| Variable                         | Gender | No: of Student Teachers | Mean | SD   |
|----------------------------------|--------|-------------------------|------|------|
| Total Digital Literacy Practices | Male   | 160                     | 2.99 | 0.68 |
|                                  | Female | 160                     | 2.83 | 0.05 |

**Table 11 Mean Values and Standard Deviations of Student Teachers' Digital Literacy Grouped by College**

| Variable                         | College   | Number of Student Teachers | Mean | SD   |
|----------------------------------|-----------|----------------------------|------|------|
| Total Digital Literacy Practices | College A | 160                        | 2.97 | 0.64 |
|                                  | College B | 160                        | 2.85 | 0.62 |

**Table 12 Mean Values and Standard Deviations of Student Teachers' Digital Literacy Practices Grouped by Year of Study**

| Variable                         | Year of Study        | Number of Student Teachers | Mean | SD   |
|----------------------------------|----------------------|----------------------------|------|------|
| Total Digital Literacy Practices | 1 <sup>st</sup> year | 160                        | 2.88 | 0.70 |
|                                  | 2 <sup>nd</sup> year | 160                        | 2.94 | 0.56 |

**Table 13 Mean Values and Standard Deviations of Student Teachers' Digital Literacy Grouped by Training Experiences**

| Variable                         | Training Experiences | Number of Student Teachers | Mean | SD   |
|----------------------------------|----------------------|----------------------------|------|------|
| Total Digital Literacy Practices | Without Training     | 216                        | 2.83 | 0.04 |
|                                  | With Training        | 104                        | 3.08 | 0.06 |

**Table 14 Mean Values and Standard Deviations of Student Teachers' Digital Literacy Practices Grouped by Specialization**

| Variable                         | Specialization    | Mean | SD   |
|----------------------------------|-------------------|------|------|
| Total Digital Literacy Practices | Physics-Bio       | 2.97 | 0.56 |
|                                  | Physics-Chemistry | 3.08 | 0.55 |
|                                  | Chemistry-Bio     | 2.96 | 0.74 |
|                                  | History-Eco       | 2.98 | 0.60 |
|                                  | Geography-Eco     | 2.76 | 0.58 |
|                                  | Geography-History | 2.69 | 0.71 |

**Table 15 One-way ANOVA Result Showing Student Teachers' Digital Literacy Practices Grouped by Specialization**

| Variable                         | Specialization | Sum of Squares | df  | Mean Square | F     | P     |
|----------------------------------|----------------|----------------|-----|-------------|-------|-------|
| Total Digital Literacy Practices | Between Groups | 5.850          | 5   | 1.170       | 3.004 | .012* |
|                                  | Within Groups  | 122.284        | 314 | .389        |       |       |
|                                  | Total          | 128.134        | 319 |             |       |       |

\*\*p<.01 \*p<.05, Note: ns = no significance

**Table 16 Tukey HSD Result Showing Student Teachers' Digital Literacy Practices Grouped by Specialization**

| Variable                   | (I)Specialization | (J)Specialization | Mean Difference | P     |
|----------------------------|-------------------|-------------------|-----------------|-------|
| Digital literacy practices | Physics-Chemistry | Geography-History | .39             | .018* |

\*p<.05

Findings for research question (5) are presented in Table 17.

**Table 17 Pearson Correlation between Digital Literacy Knowledge and Digital Literacy Practices (N=320)**

| Two Groups                 | Digital Literacy Knowledge | Digital Literacy Practices |
|----------------------------|----------------------------|----------------------------|
| Digital Literacy Knowledge | 1                          | .116*                      |
| Digital Literacy Practices | .116*                      | 1                          |

\*. Correlation is significant at the 0.05 level (2-tailed).

## Qualitative Findings

### Q.1 Using ICT

Six student teachers from Group I and six student teachers from Group II responded that the teacher taught the lesson by using ICT in their college. Six student teachers from Group I responded that the teachers who taught Myanmar, English, Science and Educational Theory subjects were using ICT in their teaching. Six student teachers from Group II said that the teachers who taught English, Bio, Science and Chemistry subjects were using ICT in their teaching.

Three student teachers from Group I and two student teachers from Group II stated that students were interested in the lesson, gained knowledge, concentrated in the lesson, and created teaching aid in using ICT for teaching. Three student teachers from Group I and four student teachers from Group II responded that teacher explained clearly and students learned quickly by using ICT.

### Q.2 Difficulties (using internet)

Two student teachers from Group I and four student teachers from Group II responded that someone can hack their accounts if someone knows their accounts and hence, they cannot be safe. They would be cyberbullied and abused in online.

Four student teachers from Group I and two student teachers from Group II stated that they bought the goods more from online shopping and faced the problem of health by using over screen time.

### Q.3 Supporting

Six student teachers from Group I and six student teachers from Group II stated that they studied ICT course such as power point, excel, word, drawing, painting, typing, internet, data base and basic computer. Computer class opened in their College was supported by KMD and two Education Colleges had E-library and free Wi-Fi for the development of digital literacy.

### Q.4 Power Point presentation

Six student teachers from Group I and six student teachers from Group II stated that students made power point presentation in group work. Two student teachers from Group I and three student teachers from Group II responded that they were more interested in the lesson when the teacher used color, audio, design and picture in PowerPoint presentation and they also collaborated with each other for making power point in group work.

Four student teachers from Group I and three student teachers from Group II responded that students gained knowledge and recognized it for a long time. And then they developed their presentation skill and can made power point on their own and they did not do more practices in

Excel application and did not use SPSS application. First year student teachers from Group I and II stated that they did not make power point presentation for teaching and learning.

### **Q.5 Using electronic teaching aid for teaching and learning**

Six student teachers from Group I stated that the competition of electronic teaching aid was held in their College. They competed the electronic teaching aid competition team by team, class by class and year by year. Six student teachers from Group II stated that the electronic teaching aid competition was held in their College, but they competed the competition department by department only.

Three student teachers from Group I and two student teachers from Group II said that students were more interested in the lesson and could realize it. Three student teachers from Group I and four student teachers from Group II stated that they could actively participate in teaching and learning and could recognize for a long time.

### **Q.6 Using internet Wi-Fi**

Six student teachers from Group I and six student teachers from Group II stated that the internet Wi-Fi was allowed to use in their colleges. Two student teachers from Group I and three student teachers from Group II stated that they searched data in google to write assignment, downloaded video and English song for English Language Teaching.

Four student teachers from Group I and three student teachers from Group II said that students found meaning and pictures by using mobile phone, students played online game, watched video in YouTube and sent message, picture and video with each other.

### **Q.7 Finding data**

Three student teachers from Group I and four student teachers from Group II stated that students searched data in Google, Chrome, YouTube, Twitter, Browser, dictionary and Wikipedia to write assignment.

Three student teachers from Group I and two student teachers from Group II said that they searched the data in Library. Six student teachers from Group I and six student teachers from Group II stated that their teachers gave them the link for finding data and name of books and journals.

### **Q.8 Difficulties (using computer or mobile phone for teaching and learning)**

Two student teachers from Group I and two student teachers from Group II stated that student used other applications, played online game and spent more time in using computer and mobile phone.

Two student teachers from Group II said that they used a computer only for two or more student teachers. Four student teachers from Group I and two student teachers from Group II stated that male student teachers had more computer experience and used computer more frequently than female student teachers. They also had a higher computer ability. Most of them had their own computers.

### **Q.9 Developing digital literacy skill**

Two student teachers from Group II stated that their college opened computer training with the support of KMD. Two student teachers from Group I and two student teachers from Group II said that digital literacy and ICT talk was held by Computer Professionals Association in their college.

Four student teachers from Group I and two student teachers from Group II responded that they wanted to study 3 periods per week for computer class, did a big project for computer course and wanted to know about E-safety.

### **The Result of Documentation**

Digital literacy of student teachers was observed from Yankin Education College and Mawlamyine Education College. It was found that there were student teachers' time-table, information and communication technology subject, student teachers' assignment and student teachers' teaching learning materials with ICT. There were two computer rooms and two computer teachers in their college. The college was held ICT talk by Computer Professionals Association and computer training. There are three Wi-Fi access in their college donated by The United Nations Educational, Scientific and Cultural Organization (UNESCO).

### **Discussion**

Finding from analyzing the levels of digital literacy knowledge of student teachers indicated that 67% of the participant student teachers were at satisfactory level and 33% of those were at below satisfactory level of digital literacy knowledge. The qualitative finding revealed that most of student teachers find out data in Google, Chrome, YouTube, Twitter, Browser, dictionary and Wikipedia to write assignment. Thus, student teachers need to know how to search and which is secure website to find out information. McGuinness (2019) indicated that it was not excellent in digital literacy and experience of online learning. According to personal factors of student teachers, there was significantly differences in student teachers' digital literacy knowledge between Mawlamyine Education College and Yankin Education College. The qualitative finding also revealed that student teachers from Group II compete the competition of electronic teaching aid in department by department. Digital literacy and ICT talk held by Computer Professionals Association in Group II. Student teachers from Group II attend computer class that was supported by KMD. According to Joint Information Systems Committee (JISC) model (2014), Digital literacy on learning skills is to study and learn effectively in technology-rich environments, formal and informal.

According to research finding, it was found that student teachers seldom participated in making a specific list by using Excel, SPSS and making an effective presentation by using PowerPoint application. The qualitative finding revealed that student teachers make power point presentation for teaching and learning in group work. First year student teacher didn't make power point presentation for teaching and learning in Group I and II. They didn't more practices in Excel application and didn't use SPSS application. Ng (2015) stated that cognitive skills include the ability to evaluate and choose appropriate software with which to learn, the ability to critically search, evaluate, and ethically and legally use digital information and resources, and the ability to create and use multimodal content and information.

According to research finding, there was significant difference in student teachers' digital literacy knowledge between male and female. The qualitative finding also revealed that male students had more computer experience and use computer more frequently. Dhindsa and Shahrizal-Emran (2011) found that females are less confident in using technology and more anxious to use it for learning. According to research findings, Pearson correlation analyses expressed that student teachers' digital literacy knowledge is positively and weakly correlated with digital literacy practices.

## Recommendations

1. Student teachers should get access to Wi-Fi connection in the entire college campus.
2. Student teachers should be encouraged to make PowerPoint presentation as assignment in first year.
3. Student teachers should be encouraged to use excel application in order that they can apply their knowledge in school when they are appointed as a teacher.
4. Student teachers should be encouraged to make electronic teaching aids one by one.
5. Student teachers should be given the knowledge about e-safety because they can share their knowledge with their pupils.
6. Student teachers should be provided with digital resources.
7. Student teachers should be encouraged to make project by using ICT.
8. Student teachers should be encouraged to use digital tools in communicating with each other.
9. Teacher educators should use digital tools in finding data, sharing knowledge and communicating with student teachers in teaching learning and everyday activities.
10. Teacher educators should integrate ICT with teaching subject and use digital tool in teaching and learning.
11. The principal should hold the ICT exhibition of student teachers' teaching learning materials and their activities.
12. ICT subject should be involved two or more periods per week and the course should be upgraded.
13. Student teachers should be encouraged to attend computer training which can support their teaching and learning activities.

## Needs for Future Study

This study mainly analyzed student teachers' digital literacy knowledge and practices in education colleges. Further research should be designed for digital literacy knowledge and practices in teacher educators from education colleges and teacher educators' professional development activities using digital tools.

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