CHAPTER 5
SUMMARY, MAJOR FINDINGS, CONCLUSIONS, SUGGESTIONS FOR EDUCATIONAL IMPLICATIONS, AND RECOMMENDATION FOR FURTHER RESEARCHES

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Summary</td>
<td>228</td>
</tr>
<tr>
<td>5.2</td>
<td>Major findings</td>
<td>244</td>
</tr>
<tr>
<td>5.3</td>
<td>Conclusions</td>
<td>248</td>
</tr>
<tr>
<td>5.4</td>
<td>Suggestions for educational implications</td>
<td>249</td>
</tr>
<tr>
<td>5.5</td>
<td>Recommendation for further researches</td>
<td>252</td>
</tr>
</tbody>
</table>
CHAPTER 5
SUMMARY, MAJOR FINDINGS, CONCLUSIONS, SUGGESTIONS FOR EDUCATIONAL IMPLICATIONS, AND RECOMMENDATION FOR FURTHER RESEARCHES

5.1 SUMMARY

The roles of teachers in today world have been changed from the teacher-centered to student-centered. The teacher is no longer the all knowing authority. The teachers’ roles are changing as a result of the use of information and communication technologies (ICT). It is needed for education to give the importance of the use of modern technology for the acquisition of information, enhancement of achievement, improvement of skills, low cost and overcoming obstacles with the current technological advancements in order to respond to the needs of modern societies. The main aim of education is that individuals should be provided with the appropriate knowledge to cope with the ever changing conditions both technologically and professionally. Attention should be given to information communication technology, by encouraging research and development and by working towards the creation and establishment of a strong database to facilitate the promotion and use of modern technology.

The current study is an attempt to make a contribution towards improving the performance and competence of the university students using e-learning in educational research methodology subject. The study evaluated the use of e-learning and traditional learning in educational research methodology subjects. As a matter of fact the use of e-learning tends to provide qualification of students and help them cope with the changing technological environment. This study aimed to introduce advanced methods of teaching to replace the traditional methods. Moreover, being the main target of the education process, learners will benefit from modern method of teaching. Some of these benefits include taking individual differences into account, flexibility, the prompt correction of errors and increasing the chances for education. The other benefit of e-learning is the delivery of education to anyone, anytime and anywhere. The e-learning depends on the ability to deploy its attributes to train the right people to gain the right knowledge and skills at the right time. Therefore, the learning & teaching will concentrate on content presentation that related to technique of using
e-learning in order for the students to understand the beneficial of using computer application at the highest level.

The students will gain more benefits from e-learning when compared to traditional face-to-face courses and lectures. In e-learning, the class work can be scheduled around personal and professional work. It reduces travel cost and time to and from school. Students can study wherever they have access to a computer and Internet. They have flexibility to join discussions in the bulletin board threaded discussion areas at any hour, or visit with classmates and instructors remotely in chat rooms. Students can develop their computer skills and encourages students to take responsibility for their learning. Overall, e-learning is the for anyone can learn, anywhere can teach and anytime can do (Khan, B. (2005))

This study compared two methods of instruction, which are e-learning and lecture & textbook method of teaching. Hence to be more precise this research should the following statement of the problem.

**Statement of the problem**

The present research has studied under the following problem:

“A study of effectiveness of e–learning on the learning achievement and research skills in educational research methodology for university students”

**Definition of the important terms**

In order to avoid the misunderstanding regarding the key words, it is obligatory on the part of the researcher to define the terms which are as follows:

1. **Effectiveness**

   Effectiveness means the ability to accomplish a purpose; the power to be effective, the quality of being able to bring about an effect. It refers to the degree to which objectives are achieved and the extent to which targeted problems are resolved.

   In the present study, effectiveness refers to the ability of e-learning and lecture & textbook method of teaching to accomplish a learning purpose in the educational research methodology subject for university students. This includes the power or the degree to be effective and the quality of being able to bring about the highest level of students’ learning achievement in knowledge and skills on educational research methodology subject.
In definition operation, effectiveness refers to the scores obtained from the learning achievement test (before and after learning) on knowledge and skills on research methodology subject using e-learning and lecture & textbook.

(2) E-learning

E-learning is variously defined as the acquisition of knowledge where the medium of instruction or delivery learning using electronic means. It is the use of electronic media and information and communication technologies (ICT) in education which is broadly inclusive of all forms of educational technology i.e. technology-enhanced learning (TEL), computer-based instruction (CBI), computer managed instruction, computer-based training (CBT), computer-assisted instruction or computer-aided instruction (CAI), internet-based training (IBT), web-based training (WBT), online education, virtual education, virtual learning environments (VLE) (which are also called learning platforms), and digital educational collaboration.

E-learning includes numerous types of media that deliver text, audio, images, animation, and streaming video, and includes technology applications and processes such as audio or video tape, satellite TV, CD-ROM, DVE, cellular phones and computer-based learning, as well as local intranet/extranet and web-based learning.

E-learning covers a wide array of activities which aims to support learning. It facilitates access to knowledge that is relevant and useful. E-learning involves the delivery of education to anyone, anytime and anywhere. The success of e-learning depends on the ability to deploy its attributes to train the right people to gain the right knowledge and skills at the right time. E-learning can occur in or out of the classroom. It can be self-paced, asynchronous learning or may be instructor-led, synchronous learning. E-learning is suited to distance learning and flexible learning, but it can also be used in conjunction with face-to-face teaching. In the present study, the e-learning is prepared on the educational research methodology subject for the university students.

(3) Lecture and Textbook teaching method

Lecture method of teaching is a teaching method which the presenter or an instructor teaches orally to a group of class participation. Lectures are used to convey the contents, ideas, experiences, history, critical information, theories and equations. It is the
learning process where the teacher conveys the knowledge to learners through speaking, narrating, and explaining on the content and the subject that the teacher had been well prepared, studied, and searched. Learners only listen, and might note down important contents while listening. The instructor might give a chance in asking questions and expressing ideas.

In this study, the lecture method of teaching was used for the control group, through the speaking, narrating, demonstrating, and enumerating, giving the depicting information as well as the data information, while learners just listen. Learners might note down on important content during the lecture and could ask questions. The lecture method of teaching in this study was used along with the textbook on the educational research methodology.

Textbook is a set of written, printed materials. It is a collection of the knowledge, concepts, and principles of a selected topic or course. It is a manual of instruction in any branch of study. Textbook are produce according to the demands of educational institutions. Textbooks are accompanied by teacher guides, which provide the supplemental teaching materials, ideas, and activities to use throughout the academic use. Most textbooks are only published in printed format, many are now available as online electronic books. Textbook is used by students as a standard work for a particular branch study of a subject.

In this study, the textbook was used for the control group, through the printed material giving the depicting information as well as the data information for learner to read. The textbook in this study are presented about the educational research methodology for university students.

(4) Learning achievement

Learning achievement refers to the real accomplishments in the students’ learning process i.e. knowledge and skills which derived from e-learning and lecture and textbook that can be measured by learning achievement tests and performance test.

In this study, learning achievement can be defined as the scores obtained from the evaluation that came from the learning achievement test and performance test on educational research methodology, before and after learning.
(5) Research skills

Research skills can be defined as an ability and capacity to construct the research acquired through deliberate, systematic, and sustained effort to smoothly and adaptively carryout complex activities or job functions involving ideas (cognitive skills), things (technical skills), and/or people (interpersonal skills).

In the present study, research skills refer to the scores obtained from the students’ performance test on educational research methodology.

(6) University students

Student is a learner, or someone who attends an educational institution. Student at university level refers to the student who enrolled or has been admitted to study in university for bachelor degree and master degree, in state as well as private institutions.

In the present study, university students refer to the first year bachelor degree students who enrolled or have been admitted to study in the Institute of Physical Education, Sisaket Campus, Thailand.

Objectives of the study

The main objectives of the present study were as follows:

(1) To study the effectiveness of e-learning on learning achievement and research skills in educational research methodology of university students in experimental group

(2) To study the effectiveness of lecture and textbook method on learning achievement and research skills in educational research methodology of university students in control group

(3) To study the comparative effectiveness of e-learning and lecture and textbook method on learning achievement in educational research methodology of university students in experimental group and control group

(4) To study the comparative effectiveness of e-learning and lecture and textbook method on research skills in educational research methodology of university students in experimental group and control group

(5) To study the comparative effectiveness of e-learning on learning achievement and research skills (pretest and posttest scores) in educational research methodology of university students in experimental group
(6) To study the comparative effectiveness of lecture and textbook method on learning achievement and research skills in educational research methodology of university students in control group

(7) To study the students’ feedback towards the e-learning and lecture and textbook method in educational research methodology.

Variables of the study
There are two types of variables in this study. The details of these two variables in this study are as follow:

(1) Independent Variables
   (1.1) The e-learning in educational research methodology
   (1.2) The lecture and textbook method in educational research methodology

(2) Dependent Variables
   (2.1) The effectiveness of e-learning as well as the lecture and textbook method on learning achievement in educational research methodology of university students
   (2.2) The effectiveness of e-learning as well as lecture and textbook method on research skills in educational research methodology of university students
   (2.3) The students’ feedback towards e-learning and the lecture and textbook method in educational research methodology.

Research questions
There were 11 research questions to be answered.
(1) What is the level of the learning achievement in educational research methodology of university students in experimental group (taught by e-learning)?
(2) What is the level of the research skills in educational research methodology of university students in experimental group (taught by e-learning)?
(3) What is the level of the learning achievement in educational research methodology of university students in control group (taught by lecture and textbook method)?
(4) What is the level of the research skills in educational research methodology of university students in control group (taught by lecture and textbook method)?
(5) Is there the significant difference between mean scores of the learning achievement (pretest scores) in educational research methodology of university students in experimental group (taught by e-learning) and control group (taught by lecture and textbooks method)?

(6) Is there the significant difference between mean scores of the research skills (pretest scores) in educational research methodology of university students in experimental group (taught by e-learning) and control group (taught by lecture and textbooks method)?

(7) Is there the significant difference between the scores of the learning achievement (pretest and posttest scores) in educational research methodology of university students in experimental group (taught by e-learning).

(8) Is there the significant difference between the scores of the research skills (pretest and posttest scores) in educational research methodology of university students in experimental group (taught by e-learning).

(9) Is there the significant difference between the scores of the learning achievement (pretest and posttest scores) in educational research methodology of university students in control group (taught by lecture and textbook)?

(10) Is there the significant difference between the scores of the research skills (pretest and posttest scores) in educational research methodology of university students in control group (taught by lecture and textbook)?

(11) What is the students’ feedback towards the e-learning and the lecture and textbook method of teaching in educational research methodology?

Hypotheses of the study

Base on the objectives of the study and the research questions, 8 hypotheses are framed in the study.

(1) There will be no significant difference between mean scores of the learning achievement (pretest scores) in educational research methodology of university students in experimental group (taught by e-learning) and control group (taught by lecture and textbooks method)?

(2) There will be no significant difference between mean scores of the learning achievement (posttest scores) in educational research methodology of university students in
experimental group (taught by e-learning) and control group (taught by lecture and textbooks method)?

(3) There will be no significant difference between mean scores of the research skills (pretest scores) in educational research methodology of university students in experimental group (taught by e-learning) and control group (taught by lecture and textbooks method)?

(4) There will be no significant difference between mean scores of the research skills (posttest scores) in educational research methodology of university students in experimental group (taught by e-learning) and control group (taught by lecture and textbooks method)?

(5) There will be no significant difference between the scores (pretest and posttest scores) of the learning achievement in educational research methodology of university students in experimental group (taught by e-learning).

(6) There will be no significant difference between the scores (pretest and posttest scores) of the research skills in educational research methodology of university students in experimental group (taught by e-learning).

(7) There will be no significant difference between the scores (pretest and posttest scores) of the learning achievement in educational research methodology of university students in control group (taught by lecture and textbook)?

(8) There will be no significant difference between the scores (pretest and posttest scores) of the research skills in educational research methodology of university students in control group (taught by lecture and textbook)?

**Importance of the study**

E-learning is one of the effective learning medias used for the development of students’ achievement and students’ quality. The importance of this study stems from the fact that it will contribute to addressing the lack of experimental studies with regard to the use of e-learning in comparison of lecture & textbook method of teaching in the higher education. The need is great for such studies especially in the area of educational research methodology for university students.
To the best of the researcher's knowledge, this study is the first of its kind in the Thailand, aiming at investigating the effects of the e-learning and lecture & textbook method of teaching on the student's learning achievement in the area of educational research methodology subject for university students. The results of this study are expected to clarify issues for policy makers regarding the e-learning and lecture & textbook method of teaching in educational research methodology subject for university students. Likewise, it will clarify issues for those in charge of training by providing useful information about the effectiveness of the different methods of education on the learning of educational research methodology subjects. Moreover, this study will pave the way for more research and studies in the future, in areas such as the use of modern technology in higher education which is in high demand in Thailand.

Limitations of the study
The limitations of this study are as follows.

(1) The research was limited to the comparative study of the effect of e-learning and lecture and textbook method on the student's learning achievement and research skills on educational research methodology. The quasi-experimental research was used as the research design of the study. The e-learning was used for the students in experimental group whereas the lecture and textbook method was used for the students in control group.

(2) The study was limited to the first year bachelor degree students in the Institute of physical education, Srisaket Campus, Thailand in the academic year of 2011-2012.

(3) The learning achievement and research skills of the university students were collected through the learning achievement test and research skills (performance) test made by the researcher.

(4) The data concerning to the students' feedback was collected through the students' feedback sheets made by the researcher.

(5) Asynchronous type of e-learning was used in this study. Asynchronous type of e-learning does not require students and teachers to be online at the same time. It is self-paced and allows students to engage in the exchange of ideas or information without the dependency of other students’ involvement at the same time.
Research design

Quasi-Experimental research (Two groups, pretest-posttest design) was employed to be the research design. In this design, one group of students (35 students) was used for the experimental group and the other group of students (35 students) was used for control group. This format is present in table 5.1.

<table>
<thead>
<tr>
<th>TABLE 5.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPERIMENTAL DESIGN (TWO GROUPS, PRETEST POSTTEST DESIGN)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>O₁ (Observe 1: Pretest)</th>
<th>X (Treatment)</th>
<th>O₂ (Observe 2: Posttest)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X₁C (Control Group)</td>
<td>(Treatment)</td>
<td>X₂C (Control Group)</td>
</tr>
<tr>
<td></td>
<td>(Taught by Lecture and Textbook)</td>
<td></td>
</tr>
<tr>
<td>X₁E (Experimental Group)</td>
<td>(Treatment)</td>
<td>X₂E (Experimental Group)</td>
</tr>
<tr>
<td></td>
<td>(Taught by e-learning)</td>
<td></td>
</tr>
</tbody>
</table>

Research tools

The researcher designated the following research tools:

1. The e-learning, title educational research methodology for university students.
2. The textbook, title Educational Research Methodology for university students.
3. The learning achievement test in educational research methodology for university students
4. The research skills test in educational research methodology for university Students
5. The students’ feedback sheet towards e-learning and lecture and textbooks method.
Construction of e-learning on educational research methodology for university students

There were seven steps for creating the e-learning programme on educational research methodology for university students.

**Step 1:** Assess the current learning situation in three parts: content, learners, and systems.

**Step 2:** Create and Convert the content

**Step 3:** Create e-learning system using learning Management System (LMS)

**Step 4:** Implement e-learning according to the research design of Quasi-experimental research, two groups, pretest-posttest design

**Step 5:** Evaluate the effectiveness of e-learning

**Step 6:** Modify e-learning programme

**Step 7:** Regular Monitor the e-learning

IOC method was applied to the responses of the judges’ agreement, the obtained scores were compared with the criteria. The statements which could be accepted should obtain IOC value between 0.50 – 1.00.

Evaluation of the e-learning was carried out to assess the efficiency ($E_1$ and $E_2$) and effectiveness of the programme.

The efficiency evaluation is done at three stages.

1. **Individual testing:** At this stage, the testing is done on one-to-one basis. It was found that the efficiency value ($E_1$) in individual testing obtained from the stepped test exercise in e-learning was 90.84 % whereas the efficiency value ($E_2$) in individual testing obtained from the posttest in e-learning was 87.50 %. The obtained efficiency value ($E_1/E_2$) in individual testing was greater than Efficiency Standard Criteria ($E_1 = 80/E_2 = 80$

2. **Small group testing:** After making necessary modifications/improvements in the e-learning on the basis of individual testing, the e-learning programme was ready to try out on a small group of students (6 students). It was found that the efficiency value ($E_1$) in small group testing obtained from the stepped test exercise in e-learning was 91.46 % whereas the efficiency value ($E_2$) in small group testing obtained from the posttest in
e-learning was 88.75 %. The obtained efficiency value ($E_1 / E_2$) in small group testing was greater than Efficiency Standard Criteria ($E_1 = 80 / E_2 = 80$).

(3) **Field testing:** The e-learning was administered on a large group of the target population (30 students). Pretests and posttests were administered prior to starting and after the completion of the e-learning respectively. The data thus collected from testing were analyzed and the e-learning was modified and made ready for use. It was found that the efficiency value ($E_1$) in field testing obtained from the stepped test exercise in e-learning was 92.25 % whereas the efficiency value ($E_2$) in small group testing obtained from the posttest in e-learning was 90.42 %. The obtained efficiency value ($E_1 / E_2$) in field testing was greater than Efficiency Standard Criteria ($E_1 = 80 / E_2 = 80$).

In order to evaluate the effectiveness of e-learning on educational research methodology for university students, the difference between pretest and posttest score was determined by t-test (dependent). It was found that there was significant difference between pretest and posttest score of effectiveness of e-learning on educational research methodology for university students. It indicated that the posttest score has greater value than that of the pretest score on educational research methodology of university students.

**Construction the textbook on educational research methodology subject for university students**

There were six steps included in the construction of textbook on educational research methodology for university students.

**Step 1: Study the curriculum**

**Step 2: Study the teaching–learning process** and prepare nine lessons in this textbook:

- Lesson 1: Introduction to research methodology and self evaluation
- Lesson 2: Descriptive research
- Lesson 3: Experimental research
- Lesson 4: Variables and hypotheses
- Lesson 5: Sampling
- Lesson 6: Research tools
Lesson 7: Data analysis
Lesson 8: Research report writing
Lesson 9: Overall summary and self evaluation (after learning)

Step 3: Create details of textbook i.e. introduction (What is this lesson about?), Fact sheets (Illustration), summary, exercises (check the learners’ progress), and suggested possible solutions

Step 4: Implement the textbook followed the research design of Quasi-Experimental research, two groups, pretest-posttest design.

Step 5: Evaluation
Step 6: Modification

Once the first draft of the textbook was ready, it was edited by the researcher. The textbook on educational research methodology for university students was given to five experts for validity checking, using IOC.

Efficiency evaluation of the textbook was carried out to assess the efficiency value ($E_1$ and $E_2$) and effectiveness of the textbook.

(1) Individual testing: The testing was done on one-to-one basis. It was found that the efficiency value ($E_1$) in individual testing obtained from the stepped test exercise in textbook was 86.25% whereas the efficiency value ($E_2$) in individual testing obtained from the posttest in textbook was 82.50%. The obtained efficiency value ($E_1/E_2$) in individual testing is greater than Efficiency Standard Criteria ($E_1 = 80/E_2 = 80$).

(2) Small group testing: In the small group of students (6 students), it was found that the efficiency value ($E_1$) in small group testing obtained from the stepped test exercise in textbook was 87.50% whereas the efficiency value ($E_2$) in small group testing obtained from the posttest in textbook was 85.43%. The obtained efficiency value ($E_1/E_2$) in small group testing was greater than Efficiency Standard Criteria ($E_1 = 80/E_2 = 80$).

(3) Field testing: The field testing was administered on a large group of the target population (30 students). Pretests and posttests are administered prior to starting and after the completion of the textbook respectively. It was found that the efficiency value ($E_1$) in field testing obtained from the stepped test exercise in textbook was 91.04% whereas the efficiency value ($E_2$) in small group testing obtained from the posttest in textbook was 90.08
%.

The obtained efficiency value \((E_1/E_2)\) in field testing is greater than Efficiency Standard Criteria \((E_1 = 80/E_2 = 80)\).

In order to evaluate the effectiveness of textbook on educational research methodology for university students. The difference between pretest and posttest score was determined by t-test (dependent). It was found that there was the significant difference between pretest and posttest score of effectiveness of textbook on educational research methodology for university. It indicated that the posttest score has greater value than that of pretest score on learning achievement and research skills in educational research methodology of university students.

**Construction of learning achievement test and research skills test**

(1) Study the course description, important learning substance, learning standard, learning objectives, learning material/medias, learning activities, learning measurement and evaluation and learning contents on educational research methodology which mentioned in the curriculum of first year bachelor degree in physical education.

(2) Study the theory, principle, and method of measurement and evaluation using achievement test.

(3) Analyze the important learning substance, learning standard, learning objectives through the consideration in its significance which to be inclusive of the educational research methodology of university students.

(4) Construct 50 items of learning achievement test and 50 questions of research skills test. The learning achievement test and research skills test were tested for their validity index, discrimination index, and reliability index.

In learning achievement test and research skill test, IOC test for validity index was found between 0.80-1.00. The difficulty value was found 0.48-0.70 whereas the discrimination value was found between 0.52-0.88.

40 items of learning achievement test and 50 questions of research skills test were accepted to be the tools of this study.

Test-retest was used for testing the reliability of the tools. It was found the \(r_{xx}\) value of the learning achievement test was 0.90 whereas the research skill test was 0.89.
Construction of the students’ feedback sheet towards e-learning and lecture and textbook on educational research methodology

Step 1: Determine the aspects of students’ feedback.

Step 2: Construct the students’ feedback sheet

The researcher constructed the students’ feedback sheet for students in experimental group (taught by e-learning) and control group (taught by lecture and textbook method).

Sample

For representative sample, it was decided to cover the bachelor degree physical education students in Srisaket Physical Education Institute Thailand. The stratified random sampling was used for selection method of sampling. There were 70 students in the study. One class (35 students) was assigned to be the sample of experimental group (taught by e-learning) whereas the other class (35 students) was assigned to be the sample of control group (taught by lecture and textbook method).

Procedure of experiment for e-learning approach

The researcher divided the procedure of experiment into two methods: e-learning and lecture and textbook method.

(1) The preparation stage:

(1.1) Prepare for the actual teaching: At this stage the researcher prepares the readiness actual experiment i.e. the computer, e-learning programme, learning achievement test and research skills test, etc.

(1.2) Students were tested by pretest on educational research methodology

(1.3) Researcher himself supervised the students regarding technique of using e-learning and prepared himself according to the important roles of instructors.

(2) The experimental stage:

(2.1) Researcher operated the e-learning programme on educational research methodology.

(2.2) Three steps of learning activities were used i.e. introduction, teaching, and conclusion.
Procedure of experiment for lecture and textbook method

Stage 1: Preparation stage: The preparation stage is divided into different stages i.e. (i) Stipulate the purpose on each time of lecturing explicitly, (ii) Study the background of learners, such as their basic knowledge, experience, requirement, interest, and information necessary for the lecture, (iii) Amalgamate all contents to be lectured, such as study the treatise, papers, documents, and knowledge sources, including personal experience and skill of the instructor, (iv) Assign the structure and sequence the content with an appropriate presentation to the time and character of learners, (v) Prepare descriptive details such as examples, information, illustration, analogous information, statistical information, questions, and creating climate, and (vi) Prepare the evaluation, such as pretest and posttest, and exercises.

Stage 2: Lecture stage: The lecture stage was emphasized on introduction, Explanation, and conclusion.

Stage 3: Evaluation stage: This was an evaluation on students’ achievement and research skills through the learning achievement test and research skills test (Posttest).

Statistics used in the study
The following statistical calculations were employed for this study.

(1) In order to determine the effectiveness of e-learning and lecture and textbook method on learning achievement and research skills of students in educational research methodology, mean (\(\bar{X}\)) and standard deviation was employed.

(2) To test the difference between the mean scores of learning achievement and research skills (pretest-posttest scores) in educational research methodology taught by e-learning and lecture and textbook method, the t-test (independent) was employed.

(3) To test the difference between the pretest and posttest scores on learning achievements and research skills (pretest-posttest) in educational research methodology taught by e-learning, the t-test (dependent) was employed.

(4) To test the difference between the pretest and posttest scores on learning achievements and research skills (pretest-posttest) in educational research methodology taught by lecture and textbook method, the t-test (dependent) was employed.

(5) Percentage (%) was used to determine the students’ feedback towards
Determining of the level of learning achievement and research skills in educational research methodology

To determine the effectiveness on learning achievement and research skills in educational research methodology of university students, the scores were analyzed to find out mean (\(\bar{X}\)), standard deviation (S.D.) and percentage (%). The maximum score of knowledge was 20, whereas the maximum scores of skills was also 20 for each respondent. The minimum score of knowledge and skills was 0.

To decide whether the scores on learning achievement and research skills indicated “excellence”, “good”, “fair”, “poor”, and “very poor”, the scores were converted into the following criteria.

### TABLE 5.2
CRITERIA OF THE LEVEL OF LEARNING ACHIEVEMENT AND RESEARCH SKILLS

<table>
<thead>
<tr>
<th>Mean Scores</th>
<th>Level of Achievement and Research Skills</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>00.00 – 08.00</td>
<td>Very Poor</td>
<td>00.00 – 20.00</td>
</tr>
<tr>
<td>08.01 – 16.00</td>
<td>Poor</td>
<td>20.01 – 40.00</td>
</tr>
<tr>
<td>16.01 – 24.00</td>
<td>Fair</td>
<td>40.01 – 60.00</td>
</tr>
<tr>
<td>24.01 – 32.00</td>
<td>Good</td>
<td>60.01 – 80.00</td>
</tr>
<tr>
<td>32.01 – 40.00</td>
<td>Excellence</td>
<td>80.01 – 100.00</td>
</tr>
</tbody>
</table>

5.2 MAJOR FINDINGS

The findings of the present study are as follow:

(1) The learning achievement (pretest) in educational research methodology of university students in experimental group (taught by e-learning) was at poor level whereas the learning achievement (posttest) in educational research methodology of university students in experimental group (taught by e-learning) was at excellent level.

(2) The research skills (pretest) in educational research methodology of university students in experimental group (taught by e-learning) was at poor level whereas the research
skills (posttest) in educational research methodology of university students in experimental group (taught by e-learning) was at excellent level.

(3) The learning achievement (pretest) in educational research methodology of university students in control group (taught by lecture and textbook) was at poor level whereas the learning achievement (posttest) in educational research methodology of university students in control group (taught by lecture and textbook) was at excellent level.

(4) The research skills (pretest) in educational research methodology of university students in control group (taught by lecture and textbook method) was at poor level whereas the research skills (posttest) in educational research methodology of university students in control group (taught by lecture and textbook method) was at excellent level.

(3) There was no significant difference between mean scores of learning achievement (pretest) in educational research methodology of university students in experimental group (taught by e-learning) and control group (taught by lecture and textbook method).

(4) There was the significant difference between mean scores of learning achievement (posttest) in educational research methodology of university students in experimental group (taught by e-learning) and control group (taught by lecture and textbook method).

The obtained mean score of the learning achievement in educational research methodology of university students in experimental group (taught by e-learning) was greater than the mean score of learning achievement in educational research methodology of university students in control group (taught by lecture and textbook method).

(5) There was no significant difference between mean scores of research skills (pretest) in educational research methodology of university students in experimental group (taught by e-learning) and control group (taught by lecture and textbook method).

(6) There was the significant difference between mean scores of research skills in educational research methodology of university students in experimental group (taught by e-learning) and control group (taught by lecture and textbook method).
The obtained mean score of research skills in educational research methodology of university students in experimental group (taught by e-learning) was greater than the mean score of research skills in educational research methodology of university students in control group (taught by lecture and textbook method).

(7) There was the significant difference between pretest and posttest scores on learning achievement in educational research methodology of university students in experimental group (taught by e-learning).

   The obtained posttest score on learning achievement in educational research methodology of university students in experimental group (taught by e-learning) was greater than that of the pretest score.

(8) There was the significant difference between pretest and posttest scores on research skills in educational research methodology of university students in experimental group (taught by e-learning).

   The obtained posttest score on research skills in educational research methodology of university students in experimental group (taught by e-learning) was greater than that of the pretest score.

(9) There was the significant difference between pretest and posttest scores on learning achievement in educational research methodology of university students in control group (taught by lecture and textbook method).

   The obtained posttest score of learning achievement in educational research methodology of university students in control group (taught by lecture and textbook method) was greater than that of the pretest score.

(10) There was the significant difference between pretest and posttest scores on research skills in educational research methodology of university students in control group (taught by lecture and textbook method).

   The obtained posttest score on research skills in educational research methodology of university students in control group (taught by lecture and textbook method) was greater than that of the pretest score.
(11) The majority of university students’ feedback towards e-learning in educational research methodology was at excellent level whereas the majority of university students’ feedback towards lecture and textbook method of studying in educational research methodology was at good level.

(12) Every student thought that e-learning was flexible with respect to time, cost and place. E-learning made them very exciting and interesting. They gained better learning experience when instruction was delivered via the e-learning lessons approach. E-learning helped them to increase the learning achievement and improved the learning performance. The students agreed that e-learning took into account the individual differences among students. They felt more enjoyable and relaxed on days when e-learning lessons were used. E-learning was effected to them not only in learning achievement but they gained the skills experience on problem-solving, creativity, and ICT skills. The students thought that e-learning gave them more room to express themselves and made them more self-confidence.

In the negative feedback towards e-learning in educational research methodology subject, the students disagree that e-learning was less effective than traditional learning in terms of clarification and explanation. They did not think that using e-learning made them feel isolated. They also did not think that e-learning had negative impact on social interaction and the development of communication skills. The slow internet and older computer did not make the accessing course materials frustrating.

(13) Regarding the positive feedback towards lecture and textbook method in educational research methodology, the students agreed that lecture and textbook method operated promptly with a great deal of content and knowledge. They think that lecture and textbook method was excellent for them in introducing a new topic and for summarizing what should have been learned whereas the lecture and textbook method of teaching provides an opportunity for better explanation of the topics and lying stress on significant ideas.

In the negative feedback towards lecture and textbook method in educational research methodology, the students mentioned that one who was weak in note-taking skills will has trouble understanding what he/she should remember from lectures. They think that teachers usually deliver the same lecture and textbook to students without recognizing the
individual differences, and the task of teacher in lecture and textbook method was to tell the students which cause them boring. They also stressed that lecture and textbook method made them to be a passive learner due to the lack of learning activity, and contents from the lecture did not arise directly through the empirical learning of learners but these contents were knowledge from the discourse of the instructor.

5.3 CONCLUSIONS

As far as the current study is concerned the results have suggested that e-learning has more positive effect on students’ learning achievement and research skills as compared to lecture and textbook method in educational research methodology for university students. The results have also shown that e-learning has more effects in terms of students’ learning achievement and research skills.

From the results of the present study, it can be concluded that:

(1) E-learning proved as more effective method to enhance the learning achievement and research skills in educational research methodology of university students.

(2) E-learning does more effect on the learning achievement and research skills as it tests for its significant difference between mean scores on learning achievements and research skills of university students in experimental group. The results of the analysis of data indicated that the mean score on learning achievement and research skills in educational research methodology of university students in experimental group (taught by e-learning) has greater value than that of the mean score on learning achievement in educational research methodology of university students in control group (taught by lecture and textbook method).

(3) E-learning does effect on the learning achievement and research skills as it tests for its significant difference between the pretest-posttest scores of learning achievement. The results of the analysis of data indicated that the posttest score of learning achievement and research skills in educational research methodology of university students taught by e-learning has greater value than that of the pretest score.
(4) Lecture and textbook method does effect on the learning achievement and research skills as it tests for its significant difference between the pretest and posttest scores. The results of the analysis of data indicated the posttest score on learning achievement and research skills in educational research methodology of university students taught by lecture and textbook method has greater value than that of the pretest score.

(5) The university students' feedback towards e-learning in educational research methodology was at excellence level which indicated the satisfaction of students when they use e-learning.

(6) The university students' feedback towards the lecture and textbook method in educational research methodology was at good level.

5.4 SUGGESTIONS FOR EDUCATIONAL IMPLICATIONS

Results of the present study demonstrated that e-learning was an affective mode for learning achievement and research skills in educational research methodology of university students. It was found that the students prefer e-learning approach of instruction over the traditional presentation approach. They enjoy on days when e-learning lessons were used and they were happy to learn new material when they learn from e-learning.

E-learning, which includes self-learning computerize activities, is a new educational approach use in many universities and educational institutions and is helpful in achieving one of the main objective of the formal education i.e. preparing the learner for an active and independent learning. Besides, it is an appropriate method for permanent and continuing education which is so essential in today's world. In fact, this approach has created a new paradigm in teaching and learning field and has provided the possibility of learning in anything, for everyone, any time and everywhere permanently. Therefore, it seems considering the widespread presence of the computers in today's life and increasing need of the teachers to use for teaching-learning process.

Lecture and textbooks method of teaching are probably the best method in many circumstances and for many students; especially for communicating conceptual knowledge and where there is a significant knowledge gap between lecturer and audience. Properly
structured-lectures may be the best teaching method for many subjects and many students, and lectures may be especially well-suited to the transmission of conceptual and systematic knowledge. Lecture and textbook method are therefore usually the best medium for teaching to the point where the student begins to specialize. In lecture and textbook method, student should understand that one major expectation is that they are required to attend lectures because the main medium of communication in a lecture is the spoken word. One important factor is that lecture note taking has the advantage of encouraging deep processing forms of memorizing, by imposing a need for students to understand. To enable lecture and textbook method to be effective for learning, the process of communication is needed.

As the results of the present study showed that e-learning method as a wide learner-centered educational method could increase the competency of the nurses in documentation as equal as lecture and textbook method. Therefore, e-learning can be used for facilitating educational programmes. The suggestions for education implications should be as follow:

For Thai Universities

(1) The teaching process in Thai universities should not rely on the traditional pattern of lecturing in relation to educational research methodology. Instead e-learning need to be introduced, where the presence of an instructor is supported by the use of modern technology, which renders the learning process more flexible in terms of time and place.

(2) In order to secure a successful use of e-learning in Thai universities, the authority and policymakers should take the following into account:

- A reliable infrastructure needs to be available in Thai universities as a prerequisite for introducing this type of modern educational approach.

- Faculty members and students need to develop the necessary ICT skills to meet the requirements of the new approach; otherwise, the lack of ICT skills could affect students’ learning achievement and research skills.

- The faculties of education in Thai universities should incorporate courses especially designed to enable learners to take advantage of modern technology including the
use of the internet in their learning process.

- The role of e-learning centers in Thai universities should be activated to take part in training staff members to make use of modern technology, so as to enable them to develop their courses electronically.

- Staff members in Thai universities should encourage students to develop their skills and to be independent learners.

(3) University may start new programmes to produce e-learning, and analysts equipped with pedagogic skills. In-service teachers should be given computer literacy training through refresher courses. It is necessary to develop a culture for better utilization of e-learning in teaching–learning process.

**For teachers**

(1) In the light of the current study, teachers should take advantage of asynchronous virtual classroom with regard to educational research methodology, given its positive effect on students in terms of learning achievement and research skills.

(2) The educational research methodology should be designed electronically in the light of instructional design models.

(3) Teachers of the present or future should make wise decisions about the use of e-learning to enhance quality of university students’ learning and to maximize utilization of this exciting teaching and learning tool.

(4) It is needed to recognize that quality instructions can be taken if teachers pay attends on using e-learning for improving the university students’ learning achievement. Teachers should be motivated to use a large number of educational software which is available at world wide webs. University can subscribe software by utilizing the internet facility or encourage teachers to construct e-learning for their teaching and learning process.

(5) New studies concerned to e-learning should be carried out in different subjects and new lessons. New projects should be started to develop the e-learning. In service training should be necessary for the teachers to use e-learning effectively and also they should have knowledge and skills about hardware and software.
For Ministry of Education

(1) It is needed for Ministry of Education to recognize the potential of e-learning for increasing the university students’ learning achievement and skills.

(2) Ministry of education should emphasize that the potential of e-learning can be utilized to enhance quality of education at university level and should provide e-learning software for teachers.

(3) Widespread use of e-learning requires a very high number of computers. Ministry of Education should provide adequate number of computers and software for educational institutions.

(4) Ministry of Education should offer incentives for teachers who increase their proficiency in computer studies and contribute to enhance e-learning.

For parents and private sections

(1) Parents should encourage their children to utilize e-learning or other educational software available in the market.

(2) Private sections may contribute the teachers to enhance in using of e-learning in university and may also contribute to develop quality e-learning software.

5.5 RECOMMENDATIONS FOR FURTHER RESEARCHES

For further studies, the research should be studies under the following problems:

(1) There should be a research to determine the effectiveness of various types of e-learning for various subject areas and at different grade levels.

(2) There should be a comparison of effectiveness of e-learning with others teaching and learning approaches on learning achievement in different subject for various grade students.

(3) There should be a study of effectiveness of e-learning by other type of experimental research i.e. factorial design research.

(4) More research needs to be conducted to investigate the availability and
adequacy of infrastructure in Thai universities regarding the use of e-learning whether synchronous or asynchronous.

(5) There is also urgent need to investigate as to whether staff members and students at Thai universities have the necessary skills to deal with modern methods of instruction such as e-learning.

(6) It is recommended that further studies need to be conducted to determine the extent to which faculties of education in Thai universities undertake their role with regard to updating students’ knowledge to enable them cope with modern technology.

(7) It is recommended that further studies need to be carried out to determine the extent to which e-learning centers in Thai universities undertake their role with regard to training staff members to take advantage of modern technology in the teaching process as to develop their skills to levels that enable them to design their courses electronically.

(8) There should be a study of impact of educational technology for improvement of students’ learning achievement and teachers’ performance.

(9) There should be a study of students’ perception on the e-learning approach.

(10) There should be an investigation of factors affecting on the utilization of e-learning.

(11) There should be an investigation of the obstacles of constructing and sustaining e-learning for the current education situation.

(12) There should be an experimental study about the best practices on the utilization of e-learning.

(13) There should be a project reviewing the interchange for development or utilization of e-learning.