CHAPTER III

RESEARCH METHODOLOGY

3.1. Introduction

This chapter describes the research methodology used in this study. The description covers research design and procedures, population and samples, and instruments for each stage of the research, together with data collection and data analysis methods. The main objectives of this study are twofold: first, to develop an English course, using assistive technology for students with ADHD at Chiang Mai Rajabhat University Demonstration School, and second, to study the effectiveness of the developed version of this course using assistive technology

3.2. Research design

This research study was one of descriptive and quasi-experimental research with a one-group pre-test/post-test design. The research was conducted in two main phases: Course development and course implementation and evaluation.

Phase 1. Course development. To develop the course, related literature was studied. Next, a needs analysis was conducted to investigate the needs for the course. Then, all the synthesized information obtained from these sources were translated into a course development plan.

Phase 2. Course implementation and evaluation. In order to evaluate the effectiveness of the developed course, a single group pre-test and post-test design were used with the aim of investigating the effect of the course on the participants' level of English reading ability. Moreover, students' creativity and self-efficacy were to investigated. To evaluate the effectiveness of the course, both quantitative and qualitative data were obtained.

3.3. Research procedures

Research procedures consist of 2 phases: course development and, course implementation and evaluation. Table 3.1 demonstrates research plan and stages undertaken in this study.

Table 3.1: Research plan and procedures

Phase of the study	Stages Undertaken	Step to be undertaken
Phase 1: Course development	Part 1: Needs analysis/ related literature review	1. Review related literature 2. Identifying population and samples 3. Design the research instruments: documentary study and semi-structured interview 4. Study the related documents 5. Conduct the semi-structured interview 6. Analyze the data 7. Specify important findings 8. Map the results of the findings of the related literature and the needs analysis to find course components
	Part 2: Course development	1. Explore and select the theoretical framework for the course development 2. Develop the course by steps by Yalden (1987)
Phase 2: Course implementation and evaluation	Part 1: Course implementation	1. Conduct the main study (9 sessions of 36 hours)
	Part 2: Evaluating the effectiveness of the course	Evaluating the effectiveness of the course using the following instruments. 1. The English reading test 2. The semi-structure interview 3. Teacher' fieldnote 4. Students' task performances

Research question I

3.3.1. Phase 1. Course development

In order to answer research question 1, 'What components should be incorporated into the English course using assistive technology ?', the related literature was studied, and then a needs analysis was conducted and translated into the course components.

3.3.1.1. Needs analysis

A needs analysis was conducted to find the needs for the course. The relevant teaching materials, learning activities and tasks, physical learning environment and behavioral interventions were the main aspects to investigate.

3.3.1.1.1. Population and samples

1. Population

The population of the needs analysis in this study consisted of students with ADHD at Chiang Mai Rajabhat University Demonstration School, in Thailand, as well as their parents and teachers, who were teaching them at the time this study was conducted.

2. Samples

Purposive Sampling Technique was used to obtain participants for the needs analysis. The samples for this needs analysis consisted of 3 groups: 1) 5 primary school students with ADHD at Chiang Mai Rajabhat University Demonstration School, 2) 5 parents of the 5 primary school students with ADHD at Chiang Mai Rajabhat University Demonstration School, 3) 3 teachers who were teaching them. All selected participants were interviewed for the required information using a semi-structured interview method. According to Babbie (2001), it is not possible to cover the entire population. Emory (1976) points out that purposive sampling regularly involves the idea of the effort to obtain a sample that meets predetermined criteria. Emory adds that a small-sized but efficient sample that provides a given precision will not lessen the significance of the study's results.

3.3.1.1.2. Research instruments

Research instruments were documentary study and interviews.

1. Documentary study

For the documentary study, ADHD students' learning styles and preferences, appropriate learning materials, together with academic instructional practices and activities were investigated. Moreover, information regarding instructional tools, physical learning environment, behavioral interventions, as well as appropriate classroom accommodations were also explored.

2. Semi-structured interview

In order to gather relevant information, a semi-structured interview was administered with 5 primary school students with ADHD at Chiang Mai Rajabhat University Demonstration School, their parents and 3 teachers, who were teaching them. The interview was aimed to obtain ADHD students' learning styles, preferences, their preferred learning activities, together with strengths and individual academic and behavioral needs.

3.3.1.1.3. Data collection

1. Documentary study

For the documentary study, the related documents and literature were studied, analyzed and synthesized in order to obtain information regarding ADHD students' learning styles and preferences, appropriate learning materials, along with academic instructional practices and activities. Moreover, information regarding instructional tools, physical learning environment, behavioral interventions, appropriate classroom accommodations were investigated.

2. Semi-structured interviews

For the interviews, data was collected through semi-structured interviews with 5 primary ADHD students, their parents and teachers on site. Information was then captured concerning each student's needs and strengths, including both academic behavioral needs and classroom behaviors, so that the instruction can be built around their existing abilities. Information from the interviews provided clues regarding ADHD students' learning styles, preferences, their preferred learning activities, strengths, as well as their individual, academic and behavioral needs.

3.3.1.1.4. Data analysis

After gathering the needed data from the four sources – the documentary study and the semi-structured interviews – all data was then analyzed to obtain the needed information .

1) Data from documentary study was analyzed by means of content analysis using Hyper Research Program to find the descriptive content domains according to main characteristics of each topic.

2) The data from semi-structured interviews was coded and analyzed by means of content analysis using Hyper Research Computer Program. The Steps that were undertaken for the analysis by Hyper Research Computer Program were as follows:

a) Review the perception literature for relevant information

b) Convert the translated log file into 'txt' file, and enter into the program.

c) Put the obtained information features as 'codes'.

d) Select and highlight the words, phrases or sentences that indicate the selected aspect

features found in the 'txt' file and apply them to codes in order to get the descriptive content domain.

e) Categorize the derived domains into categories of the selected aspect features.

f) Select and highlight the words, phrases or sentences that indicate the descriptive content domains found in the 'txt' file and apply them to codes.

g) Then, extract the report from the program.

3.3.1.2. Course development

English for students with ADHD was developed based on the needs analysis and related literature. Steps under taken in developing this course were as follows:

Step 1. Determining the goals and objectives of the course

Step 2. Selecting the syllabus type

Step 3. Writing a proto syllabus: Establish target learning content and language, teaching support, behavioral interventions, physical learning environment, and select pedagogical tasks

Step 4. Writing a pedagogical syllabus for students with ADHD: designing the course and writing lesson plans for course implementation (Yelden,1978).

3.3.1.3. Validating the course

English for students with ADHD was developed based on a combination of the information from needs analysis and related literature. Task-based approach was used as a teaching method. In order to ensure the effectiveness of the course, the developed course validation was performed in the following ways:

1. Experts' validation

The experts contributed to this study consisted of one English language instructor with a doctoral degree and more than 20 years of teaching experience, an English language instructor with a doctoral degree and expertise in task-based language teaching with more than 10 years of working experience, and finally, an English teacher who has a daughter with ADHD. The lesson plans and course materials were validated by a panel of these three experts. They are all experts in the field of English instruction with special focus on task-based language teaching and expertise in the field of special education. The experts were provided with the evaluation forms and all the materials used in this course. After receiving the evaluation from the experts, the materials were adjusted based on the experts' feedbacks. Then, the pilot study was conducted.

2. Pilot study

One lesson was pilot-tested with a student with ADHD, who had similar learning styles and preferences for 12 hours prior to the main study. The pilot study was conducted with the aims of 1) determining whether the proposed lesson plans and materials could be effectively and practically used for the purposes of this study and, 2) familiarizing the teacher with the lesson plans, activities, teaching materials and learning situation.

One lesson with a lesson plan of a pedagogical task was piloted for 12 hours in 4 sessions with 1 student with ADHD. The pilot study was administered in a similar learning place of the actual place. The topic of the lesson was the interactive storytelling of 'Matilda In Australia' by Atlas Mission Application. While learning this lesson, during the pre-task stage, the participant was explicitly introduced to the necessary vocabulary and sentence structures. Then, he was exposed to audio-visual inputs of the interactive storytelling. In the task-cycle stage, the participant carried out the performed visualize composition tasks. In the last stage of language focus, the problematic features were discussed and explain.

Research Question 2

3.3.2. Phase 2. Course implementation and evaluation

In order to answer research question 2, How effective is the English course using assistive technology? 4 aspects were performed:

1) The developed course was implemented.
2) The gained score was sought.
3) The students' creativity was investigated.
4) The students' self-efficacy was explored.

3.3.2.1. Course implementation

The actual course was implemented in 9 sessions. The instruction covered 36 hours within 10 days. Three sets of interactive storytelling were implemented.

3.3.2.1.1. Population and sample

1. Population

The population in this study was fourth and fifth grade students with ADHD at Chiang Mai Rajabhat University Demonstration School. (10 students).

2. Sample

The samples for the course implementation were the participants of fourth and fifth grade students with ADHD at Chiang Mai Rajabhat University Demonstration School. According to Yamane (1973), 43 students should be enough as a required number of participants.

3.3.2.1.2.   Instructional instruments

Two modules were derived from the process of course development in phase I (Course development). Three lessons together with three lesson plans were constructed based on the needs analysis and related literature. All needed materials, teaching method, activities and evaluation plan were selected and incorporated into the lesson plans. The course materials were validated by a panel of 3 experts in the field, before it was used in the main study. The content's validity, measured by Item-Objective Congruence (IOC) Index, was 0.97, which is very high.

3.3.2.2.   Evaluating the course

In order to answer research question 2, 'How effective is the English course using assistive technology? ' For the purpose of this question, participants' English reading comprehension abilities and achievements, as well as their creativity and self-efficacy were investigated.

In order to answer research question 2.1, Will the scores of the students' post-test be significantly higher than those of the pre-test?, the participants were pre-tested and post-tested. In addition, in order to answer research question 2.2: What is the degree of student creativity?, participants' visualize composition tasks were pre-tested and post-tested. And finally, in order to answer research question 2.3: What is the degree of students' self-efficacy?, the self-efficacy checklist and the teacher's fieldnotes were employed.

3.3.2.2.1.   Research instruments

1.   English reading comprehension ability test

The English reading comprehension ability test was used to measure participants' level of reading comprehension abilities. The test was developed by the researcher based on the course goals and objectives. This English reading comprehension test was modified from the content of the interactive storytelling of 'Four Seasons' by Atlas Mission. The test consisted of 10 questions with 4 multiple choices for each question.

This English reading comprehension test was used as both pre-test and post-test, and was administered before and after implementing the course. The pre-test was administered to assess students' English reading comprehension abilities before the implementation. The same test was used again as a post-test after the implementation on the last day of the course. The mean scores of both the pre-test and post-test were then compared and analyzed using the Paired-Samples t-test in order to determine whether the post-test scores, on average, were significantly higher than those of the pre-test.

In order to ensure that the constructed test can assess what needs to be assessed, the test was validated by an expert in the field of assessment, an expert in the field of language instruction, and an expert in the field of special education instruction so to measure its content

validity before being administered in the main study. The experts found the instrument acceptable with no comments. The overall IOC index of the content validity of the test was 1.00.

2. The visualize composition tasks

The visualize composition tasks was used to obtain in-depth quantitative data concerning creativity levels of students with ADHD. The participants were asked to draw a scene of their interest and to describe the picture they had drawn. The composition tasks were administered by the participants before and after implementing the course. However, the participants were offered drawing applications to finish their tasks, which was only done after implementing the course. The applications included 'SandDraw, My Story and Puppet Wshop'

3. The student creativity assessment rubric

The student creativity assessment rubric was used to obtain in-depth quantitative data concerning creativity levels of students with ADHD. The rubric for assessing students' creativity was adapted from Brookhart (2013). The rubric covered four different levels of creativity, including: very creative(4), creative(3), ordinary/routine(2), and imitative(1). The rubric also covered four different areas including variety of ideas and contexts, variety of sources, combining ideas, and communicating something new.

4. The student self-efficacy questionnaire

The student self-efficacy questionnaire is a self-checklist. It was employed with 5 participants in order to obtain the quantitative data concerning students' self -efficacy. The scale for assessing students' self-efficacy was adapted from Gaumer et al. (2016). The items in the questionnaire were designed to ask the participants about their ability to manage and to solve difficult problems, to determine their aims and goals, to assess their beliefs in ability to learn in class, and to determine their effort and contribution in their study and lives. The student self-efficacy questionnaire was designed in a Likert-type scale with five gradations of 10 items.

5. The teacher's fieldnotes

The teacher's fieldnotes were used to obtain in-depth qualitative data concerning the self-efficacy of students with ADHD . The teacher's fieldnotes were done daily during the study sessions to investigate students' self-efficacy. The teacher's fieldnotes focused on the students' behaviors rather than their academic issues. The fieldnotes were done after each session of the study.

3.3.2.2.2.   Data collection

For this study, both quantitative and qualitative data were collected to evaluate the effectiveness of the developed English course using assistive technology.

1.   The English reading comprehension ability test was used to pre-test all participants. The test was administered twice as pre-test and post-test in order to obtain the quantitative data about participants' English reading comprehension ability and achievements. The pre-test was administered on the second day of classes, while the post-test was on the day after the end of classes.

2.   The visualize composition tasks were administered twice as pre-test and post test in order to obtain the quantitative data about participants' self-efficacy. The pre-test was administered on the first day of classes, while the post-test was on the last day of classes. The student's creativity assessment rubrics were used to assess the participants' visualize composition tasks.

3.   The student self-efficacy questionnaires were distributed to all participants on the last day of the course after implementation, in order to obtain the quantitative data about students' self-efficacy. The researcher spared 10 minutes for participants to respond to each statement that best described their views.

4.   The teacher's fieldnotes were used to obtain in-depth qualitative data concerning self-efficacy of students with ADHD. The teacher's fieldnotes were done daily during the study sessions to investigate students' self-efficacy. The fieldnotes were done after each session of the study by the researcher, as an instructor.

3.3.2.2.3. Data analysis

1.   The ratings of the pre-test and post-test were conducted by the researcher. After that, the mean scores of both the pre-test and post-test were compared and analyzed using Paired-Samples t-test in order to determine whether the English course using assistive technology resulted in any improvement in the participants' English reading comprehension abilities

2.   The visualize composition tasks were rated by the researcher. After that, the mean scores of both the pre-test and post-test were compared and analyzed using Paired-Samples t-test in order to determine the participants' self-efficacy.

3.   The data from the student self-efficacy questionnaires was analyzed using descriptive analysis.

4.   The teacher's fieldnotes were translated by the researcher. Next, the data were coded and analyzed by the researcher by means of content analysis using Hyper Research Computer Program (Version 2.6), in order to find the descriptive content domains according to students' self efficacy in terms of social withdrawal, anxiety and emotional turmoil, inability to accept compliments, accentuating the negative, and reluctance to trust ones own opinion. The steps undertaken for the analysis by Hyper Research Computer Program were as follows:

a) Review the learning task engagement literature to find the features indicating the selected learning task engagement features.

b) Convert the translated log file into a 'txt' file, the participants' raw engagement descriptions, and enter into the program.

c) Put the selected engagement features as 'codes'.

d) Select and highlight the words, phrases or sentences that indicate the selected learning task engagement features, found in the 'txt' file, and apply codes to get the descriptive content domain.

e) Categorize the derived domains into the categories of the selected learning task engagement features.

f) Select and highlight the words, phrases or sentences that indicate the descriptive content domains, found in the 'txt' file and apply them for codes.

g) Then, extract the report from the program.