

***The Effects of Inquiry-based Learning on Understanding Writing and Presentation
Classroom Research Proposal of Science Student Teachers***

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Abstracts

The purpose of this research were to study 1) understanding of classroom research, 2) writing ability of classroom research proposal, 3) presentation ability of classroom research proposal, and 4) attitude toward the inquiry-based learning of science student teachers' that they were studying 4th years in the second semester of academic year 2019 at UdonThani Rajabhat University in Thailand, utilizing 18 students which were selected by cluster random sampling. The research instruments were 1) lesson plans of doing classroom research in science based on inquiry-based learning activity, 2) understanding of classroom research test, 3) writing ability of classroom research proposal assessment form, 4) presentation ability of classroom research proposal assessment form, and 5) attitude toward the inquiry-based learning questionnaire. The data were analyzed using mean, standard deviation, percentage and t-test one group for hypothesis. The results show that the science student teachers' understanding of classroom research, writing ability and presentation ability of classroom research proposal, and attitude toward the inquiry-based learning were at the "good" level after they participated in the series of the learning activities. They could explain objectives to make classroom research, research methodology, data collection, data analysis, statistics, and using results of classroom research to development science teaching in classroom. They showed maneuverable and presentation easy to understand. Additionally, they understand "why we do classroom research" and "classroom research essay to do". Therefore, inquiry-based learning is discussed to guide teachers how to organization of activities as appropriate for help students acquire knowledge and gain necessary skills to achieve in the future.

Keywords: Inquiry-based Learning, Classroom Research Proposal

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Introduction

Classroom Research:

A classroom research project in the imagination, imagining what research is, what a research report looks like and what it means to be a researcher. And students do not easily imagine themselves as researchers. Of all academic tasks, research is the most intimidating. It is often surrounded in mystique and seen as demanding and difficult. Can I do this? Will succeed in writing a good research report? These are common questions in the first stages of the research process (Clive Millar, 2016). The classroom is the space where the fun and excitement of learning happen. Most of the teachers in these classrooms do not think of themselves as researchers. This is a misconception, however. Engaging in classroom research can be done by practitioners and indeed it is something that teachers should do. As Nunan and Bailey (2009) explain, there are different possible definitions for “classroom research”. Fundamentally, classroom research involves doing research in school settings about teaching and learning. Julian Hermida (2001) explain that classroom action research is a method of finding out what works best in your own classroom so that you can improve student learning. There are many ways to improve knowledge about teaching. Many teachers practice personal reflection on teaching, other conduct formal empirical studies on teaching and learning. Classroom action research is more systematic than personal reflection but is more informal and personal than formal education research. In this article I define classroom research as a process of investigating questions about teaching and learning that is undertaken in a systematic way by teachers who want to better understand their own work. So in essence, classroom research is research into what teachers do that affects their teaching of children, of what children bring to the learning environment and of how they are affected by teaching. It is about the school as the centre for enquiry (McKernan, 1996), and it underpins the professionalism of teaching (Millett, 1999). Thus, classroom research covers areas such as the following:

- Teachers' knowledge, understanding, decisions, values, experience, confidence, etc
- Children's learning, responses, understanding, values, development, etc
- Teaching approaches and interactions
- Curriculum organisation, content selection, scheme and lesson planning
- Subject resources, their quality, appropriateness and use

Teachers may be less enthusiastic about the idea of doing research in class, if you think of research as something that includes a large number of participants, numerical data and statistical analysis. This is not necessarily being the case with classroom research, where the main focus is on the interaction among learners and teachers. The aim of classroom research is to increase our understanding of classroom learning and teaching (Allwright & Bailey, 1991). For example, you may want to explore the strategies young learners rely on in order to make sense of the stories they hear, or you want to find out more about the way teachers' questions scaffold classroom interaction while talking about a story. Another way to start research is to introduce a small change in the teaching process (for example, varying the seating arrangement, using stories, asking open questions, integration culture and art work, or using English in class) and then observe what benefits these changes bring in your class and in particular, how they enhance language learning. However, teachers are usually

reluctant to participate in action research and yet it has major benefits as a tool to improve reflection on classroom teaching and student learning. "If classroom research is to become a habit rather than a fluke, additional forces must come to bear" (Bondy, 2001). Bondy continues to say that state department of education through to school boards and university must take responsibility to support classroom research. Exposure to action research must be established earlier in the pre-service years in order for teachers to be prepared use research in their classroom.

Inquiry-based learning

An old adage states: "Tell me and I forget, show me and I remember, involve me and I understand." The last part of this statement is the essence of inquiry-based learning, says our workshop author Joe Exline (2004). Inquiry implies involvement that leads to understanding. Furthermore, involvement in learning implies possessing skills and attitudes that permit you to seek resolutions to questions and issues while you construct new knowledge. In our quest as educators to prepare our kids to enter the world to thrive and succeed, we constantly strive to empower them with the best aptitudes for doing so in a rapidly-changing world. These are the abilities of independent and critical thinking, creativity, curiosity, and the drive to learn anywhere at anytime. Ultimately, few instructional methods accomplish this quite like inquiry-based learning (Lee Watanabe-Crockett, 2019). Inquiry-based learning is not a new teaching strategy. In fact, you most likely learned about it in college while studying about John Dewey's educational reform. Dewey set out to advocate child-centered learning that was based on inquiry and real-world experiences. Unfortunately, in today's educational system, children are less likely to inquire and ask questions, and more likely to be subservient and listen (Janelle Cox, <https://www.teachhub.com/all-about-inquiry-based-learning>). According to Alberta learning (2004), explain about inquiry based learning is a process where students are involved in their learning, created essential questions, investigate widely, and then build new understandings, meanings and knowledge. That knowledge is new to the students and may be used to answer their essential questions, to develop a solution, or to support a position or point of view. The knowledge is usually presented to others and may result in some sort of action. Simply put, Inquiry is the personal path of questioning, investigating, and reasoning that takes us from not knowing to knowing (Ferlazza & Boss, 2015). While rote memorization is an important skill to master, inquiry is a skill that will take you into the 21st century. In today's society, our workforce demands individuals be inquisitive and be able to solve complex problems. Inquiry implies a need to know, where students seek answers and want to find resolutions. Educators can nurture these inquisitive minds so that students can carry this mind set with them throughout their life. So inquiry based-learning has other advantages as well:

Students who are actively involved in the classroom develop problem-solving skills which can be applied to their schoolwork as well as later in life.

- An inquiry-based approach can be used in any classroom and in any age group.
- Older students will benefit from more sophisticated questioning, but inquiry can be implemented into everyday activities with younger students.
- Inquiry-based learning works extremely well in a collaborative environment. Since inquiry is based on questioning, you will need at least two people to work with, one to ask and one to answer.

- Struggling students who do not do well in a teacher-led classroom respond well to an inquiry-based learning environment. It helps build their confidence and self-esteem.

Therefore, inquiry-based learning is an approach to learning that emphasizes the student's role in the learning process, including small-group discussion and guided learning. Instead of memorizing facts and material, students learn by doing. This allows them to build knowledge through exploration, experience, and discussion. Rather than the teacher telling students what they need to know, students are encouraged to explore the material, ask questions, and share ideas.

The effects of inquiry-based learning on understanding writing and presentation classroom research proposal of science student teachers

The classroom research was given emphasis in this study as it is a compulsory course for student teachers of all bachelor of education teacher professional program at UdonThani Rajabhat University in Thailand, which student teachers who studying 5th years that they internship in school and have to complete the classroom research to fulfill the requirement of the bachelor of teaching program. The classroom research proposal, it is like a blueprint that specifies the details of what proceeds to do, why do, How to do, where to do, when do, and do with who you are. With the aim of the researcher or the reader knows the framework of what to research, what is the purpose, how will the research methods be used, and how is the research useful. So before going to internship in school of student teachers should understand, writing ability and presentation ability of classroom research proposal. Therefore an attempt has been being made through this study to find the “effects of inquiry-based learning on understanding, writing and presentation classroom research proposal of student teachers”. The participant of this study were 18 science student teachers’ that they are studying 4th years in the second semester of academic year 2019 at UdonThani Rajabhat University in Thailand. The finding of the present study will help student teachers know about the research framework, research process, and research guidelines that enable to achieve pass classroom research and develop our teaching to do well.

Objectives of the study

The purpose of this study are to study understanding, writing ability, presentation ability, and attitude toward activity learning about classroom research proposal of science student teachers’ through the inquiry-based learning. A research question was developed to guide the study: ‘How did the process of inquiry-based learning develop student teachers understanding, writing and presentation about classroom research proposal?’

Methods of this study

This research conducting was separated into 2 phases as follows:

Phase 1: Developing and identifying educational quality of inquiry-based learning activity

1.1 Developing six inquiry-based learning activities to development understanding, writing ability, presentation ability about classroom research proposal by review literature about inquiry-based learning, classroom research method, and writing classroom research proposal. The detail of inquiry-based learning activity and contents were as follows:

1.1.1 The phases of inquiry-based learning activity consisted of 6 steps in this study adapted from Kath Murdoch (<http://blog.istp.org/the-inquiry-learning-cycle>)

Step 1: Tuning In; Teachers tune in to students' thinking and activate their prior knowledge; they design tasks that make the students' thinking visible.

Step 2: Finding Out; Learning communities (we consider both teachers and students to be learners) think as researchers and gather information from a variety of sources. Students are extended to go beyond the known and are challenged to use their skills to acquire new knowledge.

Step 3: Sorting Out; Learners analyze, sort, and categorize information, identifying patterns and creating meaning.

Step 4: Going Further; Learners are encouraged to further their inquiry by investigating areas of personal or shared interest.

Step 5: Making Conclusions; Learners are provided with time and space to draw conclusions and make connections between ideas and contexts.

Step 6: Taking Action; Learners reflect on their new learning and the implications for personal or shared action. Teachers encourage and empower students to apply their learning to new contexts, share with others, and connect with real-life situations.

1.1.2 Six contents of classroom research proposal using in inquiry-based learning activity, consisting with 1) Research topic, 2) Literature review, 3) Research framework, 4) Research design and method, 5) Classroom research proposal, and 6) Classroom research presentation. Each activity was for 4 hours that required 24 hours in total.

1.2 Finding educational quality of inquiry-based learning activity by five experts' evaluation in science education and educational research. The results of educational quality were at good level.

Phase 2: Instructional experimenting with science student teachers

2.1 The sample of this study were 4th year science student teachers in Faculty of Education at UdonThani Rajabhat University, UdonThani, Thailand, utilizing 18 students who were studying in the second semester, the academic year 2019, selected by cluster random sampling.

2.2 This study were two variables, the independent variable was instruction by using the inquiry-based learning activity and the dependent variable were understanding, writing ability, presentation ability about classroom research proposal, and attitude toward activity learning.

2.3 Hypothesis of this study: After the experiment, the student who learned through the inquiry-based learning activity had an average score in understanding classroom research higher than before, writing ability classroom research proposal at the "good" level, presentation ability classroom research proposal at the "good" level and attitude toward activity learning at the "good" level.

2.4 The design of this study was a pre-experimental design. Research design used is one group pretest and posttest design (John & James, 2005).

2.5 The instruments evaluation of instructional experimenting was 1) understanding classroom research test, 2) writing ability classroom research proposal assessment, 3) presentation ability classroom research proposal assessment, and 4) attitude toward inquiry-based learning activity questionnaire.

2.6 The procedures in this study taught by using the inquiry-based learning activity, before starting experimental the sample group have been applied a scale of pretest of understanding classroom research test. The teacher was informed about the purpose of the study and the inquiry-based learning activity to develop understanding, writing, presentation about classroom research proposal then using instruction, during the process teacher was observed, the interaction between teacher-students and students-students; participation and contribution of students into learning environment and teacher as well as the physical conditions and material availability of the classroom. Teacher only provided questions, suggested approaches, gave feedbacks, and assesse understanding. After finished using instruction the researcher evaluate writing and presentation ability classroom research proposal. The sample group have applied a scale posttest of understanding classroom research test that the test same pretest and give opinions about the attitude towards inquiry-based learning activity on questionnaire.

2.7 The data analysis using mean, percentage, and standard deviations of measured quantities were determine and t-test for one samples and t-test for dependent samples done for hypothesis testing

Result of this study

1. Understanding classroom research: the result of understanding classroom research after applying inquiry-based learning activity, the means of the pretest and posttest of science student teachers have compared by t-test for dependent samples. Generally, research data of this can be summarized in table 1 as below.

Table 1: The comparison between pretest-posttest of understanding classroom research of science student teachers by using inquiry-based learning activity.

N	Score	Test	Mean	S.D.	%	t-test
18	70	Pre	26.83	2.68	38.33	18.723** p<.001
		Post	53.28	5.36	76.11	

Note. **p<.01

2. Writing, Presentation ability classroom research proposal and attitude toward inquiry-based learning activity: the result of each after applying inquiry-based learning activity, the means of the posttest of science student teachers have compare with criteria standard at good level (means score: 3.51) by t-test for one samples. The research data of this can be summarized in table 2, 3, and 4 as below.

Table 2: The comparison between posttest and criteria standard of writing ability classroom research proposal of science student teachers by using inquiry-based learning activity

N	Test	Score	Mean	S.D.	%	criteria standard	t-test
18	Post	5	3.97	0.34	79.42	3.51	46.84** p<.001

Note. **p<.01

Table 3: The comparison between posttest and criteria standard of presentation ability classroom research proposal of science student teachers by using inquiry-based learning activity

N	Test	Score	Mean	S.D.	%	criteria standard	t-test
18	Post	5	3.90	0.39	78.00	3.51	40.83** p<.001

Note.**p<.01

Table 4: The comparison between posttest and criteria standard of attitude toward

N	Test	Score	Mean	S.D.	%	criteria standard	t-test
18	Post	5	4.16	0.25	83.24	3.51	66.53** p<.001

inquiry-based learning activity of science student teachers'

Note.**p<.01

Finding and Discussion

The research finding indicate that science student teachers' learning through the inquiry-based learning activity have an understanding about doing research in the classroom higher than before. The student's writing ability and presentation ability of classroom research proposal, and attitude toward the inquiry-based learning were at the "good" level after they participated in the series of the learning activities. For discussion, the inquiry-based learning activity on classroom research proposal covered learning standards, contents, learning objectives, measurement and evaluation, inquiry-based learning instructional activities, instructional media, and records after using the inquiry-based learning activity. From activities, it is found that a learner develop question about doing research in the classroom that they are hungry to answer. They can learn from it is their own unique way. Teacher is on hand to guide research and answer questions, but don't do the work for them and allows them to see the teacher as a trusted resource as they uncover details on their own. The learning activity is focused on developing learners' competency with practices of doing and thinking about "How to do classroom research or how to write and present classroom research proposal to other people to understand". Students use evidence to develop explanations. The activities of inquiry-based learning could encourage learners to learn from activities with their peers in the classroom. It was found that most of the learners enjoyed the activity and cooperated with the activities as well. Moreover, they could explain objectives to make classroom research, research methodology, data collection, data analysis, statistics, and using results of classroom research to development science teaching in classroom. They showed maneuverable and presentation easy to understand. Additionally, they understand "why we do classroom research" and "classroom research essay to do". So inquiry-based learning activity often involve students developing their own questions to investigate based on intriguing observed phenomena, working in group to plan and carry out an investigation to answer their question, and communicating their results with classmates to give everyone a fuller understanding (e.g., Institute for Inquiry at the Exploratorium, 2014) These activities are learner-centered, focused on what the learners do rather than on what the teacher does, but they are also not a free-for-all; the teacher has specific learning goals for students and can nudge and guide student towards those as the activity progresses. However, the inquiry-based learning activity

has some limitations. If the teacher does not have sufficient understanding of the process begin with curiosity; when you cannot activate a student's interest and curiosity in a particular subject, you'll not see real engagement and mastery of the topic at hand. In addition, the inquiry-based learning activity of this study takes a long time because there are 6 steps in the learning procedure in which students must spend time searching for answers. As a result, teacher should make clear lesson plans to achieve precise time management before teaching.

Conclusion

Based on the findings obtained in this study, it can be said that the students who have been educated by inquiry-based learning activity on understanding, writing ability, and presentation ability of classroom research proposal, and attitude toward inquiry-based learning activities have become more successful with criteria standard at good level. The inquiry-based learning activity aspires to engage students in an authentic discovery process. From a pedagogical perspective, the complex process is divided into smaller, logically connected units that guide students and draw attention to important features of thinking. In this study inquiry-based learning activity are 6 steps adapted from Kath Murdoch (<http://blog.istp.org/the-inquiry-learning-cycle>) as Tuning In, Finding Out, Sorting Out, Going Further, Making Conclusions, and Taking Action that engage students in knowledge-building by bringing them together frequently to share thinking and discuss the big ideas of an inquiry. However, inquiry-based learning is not a prescribed, uniform linear process. Connections between the phases may vary depending on the context. Therefore, inquiry-based learning is discussed to guide teachers how to organization of activities as appropriate for help students acquire knowledge and gain necessary skills to achieve in the future. Classroom teachers should consider how to prepare learning environment in which students will be active in accordance with their characteristics and the present these environments to students. Further, the teachers will have to revisit initial theories and ideas about questions and reflect on the way that the initial understanding differs from current understanding

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