

A COMPARATIVE STUDY OF STUDENT ACADEMIC ACHIEVEMENT AND SATISFACTION IN GRADE 4 SCIENCE UNDER TRADITIONAL INSTRUCTION AND COOPERATIVE LEARNING INSTRUCTION METHODS AT SARASAS WITAED BANGBON SCHOOL, THAILAND

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Abstract: The National Education Act of B.E. 2542 (1999) as well as the Basic Education Core Curriculum of 2008 emphasize the importance of both the acquisition of the English language in present Thai society, as well as the development of 21st century skills for all Thai children. Furthermore, the Thai Ministry of Education supports and encourages cooperative learning as a way to create appealing, motivating, and meaningful learning. Unfortunately, this vision is often not shared by schools in Thailand, which prefer a more traditional instructional method. This comparative study aimed at measuring academic achievement as well as student satisfaction under two instructional methods - traditional instruction and cooperative learning instruction. The research was conducted in science grade four at Sarasas Witaed Bangbon School, Bangkok, Thailand. Science as a school subject is ideal for the implementation of cooperative learning. Indeed, science literacy develops critical thinking, analysis, and cooperative skills. A total of 122 students took part in this study over a period of six weeks during the second semester of the school year 2015. The research included six objectives. Objectives one and two were to determine student academic achievement under traditional instruction and cooperative learning instruction methods. Objectives three and four were to determine student satisfaction under traditional instruction and cooperative learning instruction methods. Finally, objectives five and six were to compare the results between the instructional methods in order to determine if an instructional method was more efficient and/or appealing. The findings of this study suggested that academic achievement of the cooperative learning group did not improve significantly. Student satisfaction was higher for the cooperative learning group than the traditional instruction group. Recommendations for school administrators and future researchers are provided.

Keywords: Cooperative Learning, Traditional Instruction, Bilingual School, Science, Grade Four, Bangkok, Thailand, Student Satisfaction, Academic Achievement.

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Introduction

In recent years, globalization has undeniably expanded rapidly throughout the world and each nation is now trying to modify its education system accordingly (Robinson, 2008). Furthermore, with the Association of Southeast Asian Nations (ASEAN) integrated community being officially initiated as of the end of December 2015, English has become the official working language of the community (Deerajviset, 2014). The National Education Act of B.E. 2542 (1999) as well as the Basic Education Core Curriculum of 2008 stress the importance of the acquisition of a foreign language in the present Thai society, as it allows learners to grasp an understanding of diversity of cultures in the world community (Office of the National Education Commission [ONEC], 1999; Thai Ministry of Education, 2008).

Unfortunately, Thailand has suffered from poor results in international English examinations during these past years. Indeed, the English Proficiency Index of 2014 ranked Thailand at the 48th place out of 63 internationally, and 11th place out of 14 Asian countries (Education First [EF], 2014).

In order to help Thai children learn a subject in a foreign language, it is important to create appealing, motivating, and student-centered teaching models such as cooperative learning. Undeniably, studies over the years have consistently demonstrated the efficiency of cooperative learning (Gillies & Boyle, 2009; Ransdell, 2003; Walters, 2000). This educational paradigm is supported and encouraged by the Thai Ministry of Education as an effective teaching method (Phunghol, 2005).

Research Objectives

Six research objectives were designated for this research.

1. To determine student academic achievement under traditional instruction method in grade 4 science.
2. To determine student academic achievement under cooperative learning instruction method in grade 4 science.
3. To determine the level of student satisfaction under traditional instruction method in grade 4 science.
4. To determine the level of student satisfaction under cooperative learning instruction method in grade 4 science.
5. To compare students' achievement between traditional instruction and cooperative learning instruction methods in grade 4 science.
6. To compare students' satisfaction between traditional instruction and cooperative learning instruction methods in grade 4 science.

Conceptual Framework

The conceptual framework displays the instructional methods used with the grade 4 students throughout this study. The two independent variables were traditional instruction method and cooperative learning instruction method. Student achievement and student satisfaction, which are the dependent variables, were measured independently for the two instructional methods at the end of the teaching period.

(See Figure 1 on the next page)

Review of Literature

The Situation in Thailand

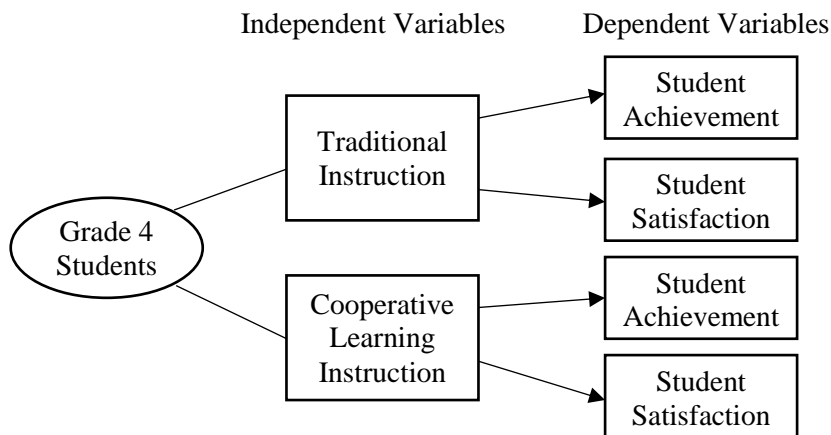


Figure 1: Conceptual Framework of The Study

As far as education is concerned, Thailand has undergone a quite peculiar situation. Although the Kingdom's budget allotment towards education is one of the highest in the region (Digital Content, 2014), Thailand has failed to demonstrate a sufficient level of achievement (Assavanonda, 2013; Maxwell, 2014; Parpart, 2013; Pusawiro, 2014). Indeed, for 2015, the government budget allocation for education represented 20.6% of the total budget, which corresponded to an amount of roughly five hundred and thirty-one billion baht (Bureau of the Budget, 2015). Unfortunately, even though Thailand spends largely on education, the results obtained by Thai students have not matched expectations for quite some time. The EF English Proficiency Index of 2014 ranked Thailand at the 48th place out of 63 internationally, and 11th place out of 14 Asian countries (EF, 2014). The low English proficiency issue is well known to education professionals as well as the government (Partridge & Eamoraphan, 2015). Yet, it seems that even though everybody demonstrates good intentions, effective implementation of the existing regulations fails to happen (Maxwell, 2014; Pusawiro, 2014).

The National Education Act of B.E. 2542 (1999)

The National Education Act of B.E. 2542 (NEA, 1999) is the primary legal document policing the Thai education system. The NEA stipulates in chapter 4, section 22, that education shall be based on the principle that all students are capable of learning and self-development, and the teaching-learning process shall aim to enable learners to develop at their own pace. Section 24 adds that educational institutions should provide student-centered methods of instruction by offering material and arranging activities in accordance with the learners' aptitudes and interests, bearing in mind individual differences. Sections 26 and 30 emphasize the need for institutions to provide a variety of instructional methods and to develop an effective learning process (Office of the National Education Commission [ONEC], 1999).

The Basic Education Core Curriculum

The Basic Education Core Curriculum B.E. 2551 (2008) emphasizes the importance for Thai students to develop 21st century skills, such as creative and analytical skills, teamwork capability, in addition to technological knowledge. Furthermore, it stresses the necessity for Thai students to become proficient in English as it opens new understanding of the diversity of cultures in the global community. The goals of the Basic Education Core Curriculum B.E. 2551 (2008) are to develop knowledge and skills for communication, technological know-how, problem-solving, critical thinking, and life skills. The learning process is also defined in the curriculum. The learner-centered approach is strongly advocated (Thai Ministry of Education, 2008).

The No Fail Policy

Even though there is no clear description of a *no fail policy* in official documents, the practice is wide spread among Thai educational institutions (Cadias, 2013). The Basic Education Core Curriculum B.E. 2551 (2008) states that learners must be assessed on, and pass, all criteria of the corresponding learning outcomes, based on the standards prescribed in the Basic Education Core Curriculum. It is nonetheless at the discretion of the different schools to adjust test results in order to move students to a higher grade. Indeed, the official document states that educational institutions have the right to correct minor insufficiencies by offering remedial measures such as extra schooling or retest for the failed course (Thai Ministry of Education, 2008).

Science and the Basic Education Core Curriculum

The Basic Education Core Curriculum B.E. 2551 (2008) describes the science subject as crucial in daily life. The benefits include the development of critical, logical, analytical, and creative thinking. Furthermore, investigative skills, problem-solving skills, and decision making skills are all enhanced by the study of science at school. Therefore, the body of knowledge brought by science is undeniably indispensable to modern society (Thai Ministry of Education, 2008).

Sarasas Witaed Bangbon

Sarasas Witaed Bangbon School is a bilingual institution that aims at teaching the Thai curriculum in both Thai and English languages. The school is part of the Sarasas School Chain. The Sarasas group started back in Bangkok in 1964. Since then, the chain has opened 37 institutions nationwide, including 24 bilingual schools. Sarasas Witaed Bangbon opened in 2000, and was the fourteenth school of the Sarasas group as well as its fourth bilingual school. The bilingual program that Sarasas Witaed Bangbon School offers is known as the English Program (EP) at Sarasas School (Sarasas Ektra School, 2014). The English Program follows the design of the immersion model, meaning that students are placed in an English-speaking class with an English-speaking teacher for the duration of the given lesson. Students are expected to acquire the content of the material taught in English even though they are learning the same topic in their native language at a different time of the week (Pacific Policy Research Center, 2010).

Science in the World

The world is deeply shaped by science and technology. Contemporary challenges like protecting the environment, decreasing poverty, and improving human well-being all necessitate an increasing demand for accomplished scientists and mindful citizens alike (UNESCO, 2010). Science involves an array of instruments, technological devices and products which facilitate our lives and works. The benefits from scientific knowledge combined with other disciplines enable us to develop thinking skills in various respects (Thai Ministry of Education, 2008). Indeed, science literacy develops analysis, discussion, and critical thinking skills among others (UNESCO, 2010).

Science in the Classroom

Science education emphasizes actively involving students in order for them to assimilate, practice, and master the use of present scientific knowledge and skills (Stahl, 1996). Another aim of science education is to improve students' skills to sort sense from nonsense, and develop their critical thinking abilities (Johnson, Johnson, & Smith, 1997). School science generally involves applied work of some sort. Consequently, for both pedagogical and class management reasons, science is an ideal subject for the cooperative learning support (UNESCO, 2010). Indeed, science is moved forward by cooperation. Cooperative learning challenges pupils and increases their motivation by providing positive reinforcement (Lyman & Foyle, 1988).

Traditional Instruction

The traditional instruction model, also known as the direct instruction model, is highly teacher oriented. Indeed, the method focuses on lectures, simple oral recitations, rote learning, and memorization; thus leaving no or little place for what the students think, like, or feel (Beck, 2009). Traditional instruction stresses knowledge as the content to be transmitted, the instruction as the demonstration of it, and the learning as the assimilation (Thamraksa, 2011). Under traditional teaching methods, students are seen as identical units of raw material ready to be shaped and standardized (Phungphol, 2005). The obvious downfall of the process is that the teacher alone dominates the instruction (Phungphol, 2005; Thamraksa, 2011). In the traditional teaching method models students become passive recipients of the learning (Thamraksa, 2011). Furthermore, the constantly increasing amount of material to memorize becomes quickly overwhelming. Students lose interest as the subject appears stressful, crushing, boring, and no longer enjoyable (Phungphol, 2005).

However, the ability for the method to survive is evidence of its strength (Kasambira, 1993). Unfortunately, for this method to be really efficient, students must demonstrate a high level of individual interest and motivation towards academic activities (Andersen, 2011).

Student-Centered Approach

Student-centered activities stimulate the development of problem solving and critical thinking in students by placing students at the core of the learning process (Brush & Saye, 2002). In so doing, pupils' opinions, experiences, needs, and objectives are

included in the learning environment (Thamraksa, 2010). During the learning process, the students construct their own meaningful and coherent knowledge, based on available data. Later, this new knowledge is linked to previously known information in a meaningful way, which facilitates critical and creative learning (Parsons & Beauchamp, 2012). In a student-centered class, the knowledge is constructed through authentic experiences set in a tangible context (Thamraksa, 2010).

The role of the teacher becomes that of a facilitator. The teacher is there to assist the pupils through the learning process (Parsons & Beauchamp, 2012). Since personal motivation plays an important role in learning, the instructor should foster motivation by encouraging positive feelings and emotional security, and eliminate negative emotions like anxiety and feelings of incompetence (Phungphol, 2005).

Differentiated Instruction

Differentiated instruction theories assert that teachers must adjust their teaching to the students' various needs and levels of understanding to maximize their learning (The Iris Center, 2015; Tomlinson, 1999). In a differentiated classroom, teachers understand that all learners differ in important ways and use it as an educational strategy. Therefore, they must develop and provide instruction through diverse learning approaches in order to appeal to the numerous interests displayed by the pupils (Tomlinson, 1999). The degree of complexity brought by the diverse learning activities must be adapted to the students' various levels of understanding. In differentiated instruction, teachers must ensure that a student competes against her or himself rather than against fellow students. The aim is for each student to achieve more than they thought they could do (Tomlinson, 1999).

Constructivism

Constructivist theories assert that learners must uncover and personally transform complex information, confront them against old assumptions, and revise obsolete knowledge when necessary (Hein, 1991; Swan, 2005). As each learner constructs their personal knowledge, the teaching methods should focus on the reality that knowledge acquisition depends to a great extent on the experiences undergone by the learner (Hein, 1991). Constructivism also insists on the importance of the culture. Indeed, students' views on diverse concepts are also built dependently to the cultural environment (Cobern, 1993). Students' ideas are founded according to their cultural surroundings, and their analysis is an interpretive deduction (Geertz, 1973).

Vygotsky (1978) developed the concept of the zone of proximal development, where students add to past experiences so as to progress along their own learning path. The definition of the *Zone of Proximal Development* offered by Vygotsky (1978) is the difference between the actual level of development acquired by independent problem solving and the potential development level determined by the ability to solve problems under adult or more capable peers' guidance. Therefore, the interaction with peers is an effective way to develop skills and strategies. The use of cooperative learning is then advocated to support less competent students through the zone of proximal development (McLeod, 2010).

Cooperative learning

Cooperative learning is an instructional method using small groups of students working together to achieve a shared goal (Hatipoglu, 2013; Johnson, Johnson, & Smith, 1997). In a cooperative class, students are given responsibility to learn the assigned material, and make sure other team members learn the subject also (Johnson & Johnson, 1997). Cooperative learning tries to capture the essence of peer group in order to support the team in moving forward (Slavin, 2012). Structured activities improve children's cooperation by learning to share, take turns, and care for peers. Cooperative learning activities improve children's relationship with others both in the classroom as well as in the playground (Hatipoglu, 2013; Lyman & Foyle, 1988). Furthermore, the transfer of responsibility from the teacher to the student encourages an exchange of ideas and the construction of new knowledge based on previous experiences (Perkins, 1999).

In order to achieve tangible results in cooperative learning, it is important to include the essential component of cooperation in the lesson structure (Johnson & Johnson, 1994). The five indispensable components for a successful cooperative learning class are positive interdependence, individual accountability, face to face interaction, interpersonal and small group skills, and group processing (Johnson & Johnson 1994; Johnson, Johnson, & Smith 1991; Kagan, 2000; Putnam, 1997; Slavin, 2012; Stahl, 1996).

The Cooperative Team

Grouping students is an important part of cooperative learning. Individual teams should be assigned by the instructor so as to ensure heterogeneous groups (Johnson, Johnson, & Smith, 1991; Putnam, 1997; Slavin, 2012; Stahl, 1996). However, the teacher should not allow students to create their own teams since this too often leads to segregation and is counterproductive. The size of a group can vary according to a number of factors such as the task requirement, the complexity of the activity, the time available, and the cooperative skills displayed by the students (Putnam, 1997). However, studies suggest that students learn better in small groups of three to four members. Furthermore, pupils generally perform better in mixed-ability groups and pairs (Gillies & Boyle, 2009).

Cooperative Learning Versus Collaborative learning

Cooperative learning is a particular sort of collaborative learning. The aims and objectives of cooperative learning stress proficiency of facts, cognitive development, as well as personal and social skills, while collaborative learning focuses more on knowledge construction and development of autonomy (Ragupathi, 2002). Cooperative learning activities are generally more structured and individual accountability plays a greater role (Ragupathi, 2002). The tasks given are usually straightforward, precise, and the answers expected restricted. In contrast, collaborative learning empowers students to a greater degree. The complexity of activities provided is increased and the outcomes more open-ended. Thus collaborative learning is only adapted to a higher level of learning (National Institute for Science Education [NISE], 1997).

Research Methodology

This comparative study used a quantitative approach as it used a pre-test and post-test designed to compare student academic achievement under the two different methods of instruction. Furthermore, the research tried to underline if students displayed a difference in level of satisfaction between the two instruction methods. This research was a quasi-experimental study as it used two groups of students.

The research took place in grade four science at Sarasas Witaed Bangbon School, Bangkok, Thailand during a period of six weeks stretching from the 4th of January to the 12th of February 2016. A total of 12 periods of instructions each lasting 50 minutes were needed to complete the research. The subject taught covered Unit 6 of the science book named *Universe and Solar System* (Academic Foreign Staff, 2007).

In order to know if a difference of ability existed between the classes prior to the research, previous examination scores were analyzed using an ANOVA test. The scores did not display a significant difference between the five classes. In order to compare similar group sizes, the last class, named 4/5 was left out of the research and used for the try out, leaving 122 students in total involved in this research.

Two groups were designated for the purpose of this study. The control group involved 60 students taken from the classes named 4/1 and 4/3, and followed the traditional instruction method which was based on teacher centered techniques, memorization, and rote learning. The experimental group involved 62 students taken from the classes named 4/2 and 4/4, and followed the cooperative learning instruction method which was based on student-centered techniques, differentiated instruction, and group work.

To measure academic achievement a pre-test and post-test were given to both groups. The pre-test was given all the students prior to the instruction in order to determine their existing knowledge of the subject. The post-test was given after the instruction took place in order to determine students' knowledge gained after instruction. Student satisfaction was measured using a five-point Likert scale satisfaction survey composed of 18 items. The survey was given to students at the end of the research in order to determine their level of satisfaction toward the instructional methods. Results of both groups were then compared to come to a conclusion.

Findings

From the analysis of data, the findings were as follows:

1. Both traditional instruction method and cooperative learning instruction method increased student academic achievement. The control group showed an increase of 54% between the pre-test and post-test. The experimental group displayed an increase of 68% between the pre-test and post-test.
2. Although the score increase between the pre-test and post-test was higher for the experimental group, there was no significant difference in student academic achievement between the control and experimental groups.
3. Both groups scored a high level of satisfaction towards the instructional method.

4. There was a significant difference in the level of satisfaction with the experimental group scoring a higher level of satisfaction than the control group.

Discussion and Conclusion

Academic Achievement

The context in which this study took place failed to integrate several of the five indispensable components for successful cooperative learning to take place. Indeed, the researcher, who was also the teacher, noted that positive interdependence and individual accountability were the most challenging concepts for students to grasp and implement. This situation has been described before in Thailand, where a strong hierarchical structure exists and collides directly with student centered teaching methods, which in return leads to difficulties in implementing student centered and cooperative learning methods (Phungphol, 2005; Nicholls & Apiwattanakorn, 2015).

To begin with, the researcher struggled in implementing positive interdependence within the students' teams of the experimental group. Over the years, students at Srarsas Witaed Bangbon have developed individualistic patterns, making it difficult for them to comprehend the benefit of sharing their knowledge and resources with others. This observation was made on many occasions, where the researcher could witness students with advanced academic skills being reluctant to share their findings with their most challenged teammates, and/or help them in their learning. An explanation as to the origin of this frustrating situation could be found in the culture of the school itself, which promotes teacher-centered and traditional instruction methods, typically discouraging students from interacting with each other during lessons. The school culture merely reflects the Thai culture in general. Indeed, Thailand is imbedded in a highly hierarchical culture where students are seen as lower than their teachers. In this context, students are not supposed to question or challenge their teachers or anyone seen as higher (Phungphol, 2005). This cultural element was previously known to the researcher who had attempted to promote positive interdependence through explanations, analogies and play. Unfortunately, due to the short span in which the study took place and despite all his efforts, the researcher failed to reverse the rooted tendency of individual exclusion.

The failure in properly implement individual accountability can be rationalized by the no fail policy followed by the school. Undeniably, by the time students have reached grade four, they already have assimilated the fact that whatever their input was, the school would not fail them, thus, making it very difficult to increase extrinsic motivation. Another consequence of the no fail policy implemented by the school was the lack of students' knowledge of the language of instruction. For some students, the deficiency of English proficiency acted as a deterrent resulting in a reluctance to engage in classroom activities. As a consequence, intrinsic motivation was hardly increased in the same category of students.

It is the researcher's belief that all the elements discussed above are interconnected. Indeed, the lack of individual accountability leads to passivity. Passivity allows the knowledge gap to widen among students, which in turn raises distrust and disregard from students willing to put in the effort. All of which ensure a

lack of positive interdependence. Yet again, it is the researcher's belief that these elements are directly linked to Thai culture in general.

Students' passivity as well as distrust were often discussed during group processing, where eager students would often complain about the passivity of their peers. In most cases, the approximate top 10% of students were complaining about the bottom 10%, often saying that their friends did not want to partake in any sort of activity, regardless of the support given to them by their peers.

The time frame in which the study took place as well as the amount of material to be learned played a significant role as well. The time span of six weeks in which the study was conducted was relatively short, making it difficult to properly prepare students for the challenges of working cooperatively.

Student Satisfaction

Although students in both groups scored a high level of satisfaction, the student satisfaction analysis pointed out that the satisfaction level of students who underwent cooperative learning instruction method was significantly higher than the control group.

Most of the students in the experimental group felt that the lessons were more enjoyable and welcoming, and that their peers were helping them to a greater extent. This impression was less obvious in the control group. Seventy-seven percent of students in the experimental group felt welcome in their science class compared to 65% in the control group. Furthermore, 72% of students in the experimental group stated that they enjoyed learning science compared to 60% in the control group. This observation is important as students tend to perform better if they enjoy their class more (Bandura, 1991; Phungphol, 2005). Sixty-nine percent of the students in the experimental group felt that their friends were helping them learn, compared to only 47% in the control group. The fact that pupils in the experimental group felt that their friends were helping them is a sign that cooperative learning could be implemented, and would indubitably work after a period of transition.

In conclusion, even though academic achievement did not show a significant difference between the control group and the experimental group, the fact that students in the experimental group displayed a higher level of satisfaction than their peers is a sufficient reason to implement cooperative learning in the science class at Sarasas Witaed Bangbon School. Given more time and an improved groundwork, it is the researcher's belief that academic achievement would increase significantly through cooperative learning instruction method.

Recommendations

The recommendations of the study are intended for the school administrators and the teachers at Sarasas Witaed Bangbon, as well as to future researchers interested in conducting similar studies.

Recommendation for School Administrators

The findings of this study can be used for grade four science at Sarasas Witaed Bangbon. Students tend to prefer cooperative learning instruction over traditional instruction. Furthermore, as no deficit in academic achievement could be found for

the experimental group, the implementation of the method is highly recommended for the study of science. Indeed, students' feelings and perceptions towards their learning is an important factor in their personal development and willingness to participate in academic activities.

Recommendation for the Teachers

Teachers wishing to implement cooperative learning instruction method should be aware that the approach demands significant preparation before the instruction period begins in order to achieve positive interdependence. Traditionally, Thai students are not asked to share their work or help others. Furthermore, the no fail policy implemented by the Ministry of Education allows students' passivity and English knowledge deficiency. Countering these factors demands utmost preparation, understanding of Thai culture, near-infinite patience, and perseverance.

Recommendation for Future Researchers

The important factors affecting this research were length of the study, students' passivity, English knowledge deficiency, lack of positive interdependence and lack of individual accountability. Future research should take these elements into consideration as measured study variables and emphasize the groundwork necessary to counter these difficulties.

These variables could be addressed in future research so as to correct the academic achievement results displayed in this study. Exploration in other fields than science could be implemented with the purpose of comparing results of a similar population in more than one subject.

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