A COMPARATIVE STUDY ON STUDENTS' SCORES THROUGH COLLABORATIVE LEARNING AND NON-COLLABORATIVE LEARNING AT SAINT JOSEPH BANGNA SCHOOL, THAILAND

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Abstract: In 1999, Thailand triggered some drastic changes and reforms by implementing the National Education Act (NEA). Accordingly, students were encouraged to become critical thinkers, and to acquire information technology knowledge based on the student-centred model. These reforms have socio-constructivist roots, promoting the use of collaborative learning, and the use of information technology. Almost fifteen years after the implementation of the NEA, the purpose of the current study was to examine if collaborative learning, for the computer science subject, would be beneficial for the grade seven Thai students of the English Program at Saint Joseph Bangna School or, as some research stated, it would be very hard to implement because of cultural hindrances. This study had three objectives. The first objective was to compare the difference among the pre-tests and post-tests scores of the experimental group who studied through collaborative learning. The second objective was to compare the difference among the pre-tests and post-tests scores of the control group who studied through non-collaborative learning. The last objective was to compare the difference among the post-tests scores of the experimental group who studied through collaborative learning with the control group who studied through non-collaborative learning. The pre-test and the post-test were the same, and consisted of 25 multiple choice questions based on a Microsoft Office Specialist certification test for the Microsoft Excel software. In conclusion, this study suggests that collaborative learning delivers better outcomes for Thai students for the computer science subject.

Keywords: Collaborative Learning, Non-Collaborative Learning, Computer Science Subject, Thailand

Introduction

Our contemporary world embraced the information age in the late 70's. With the rise of computers, the invention of the Internet, its growth, and its role in our daily lives, computers have drastically remodelled our fast evolving society creating permanent rapid changes, including those made in the educational field. Knowledge is instantly

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accessible, information is all around; our generation is walking in waves of digital codes which can be conveniently interpreted fairly immediately.

Since knowledge is everywhere, and instantly accessible in our modern developed society; the new paradigm in education is to teach students what to do with this information, and how they can take decisions that will benefit their communities. Teachers' major new roles are, not only to provide students with the skills to retrieve knowledge, but most importantly to educate them on how to use it. Students need to critically analyse information, and make good use of it. Another skill that they need to master is how to work socially. Computers are connecting people all around the world, increasing social interaction, and reinforcing the bond with the community which has become sine qua non in our modern society; we live and interact with each other. It is a necessity that students learn to learn in groups, and relate to their community through real life issues. Consequently, the long-established role of schooling that transmitted knowledge mainly in a traditional face-to-face instruction has shown its limits; education is not anymore a one way process where the sage is on the stage and students are passively and individually waiting for their lessons to take place. This is where collaborative learning, as an instructional method, shows its strengths.

Collaborative instruction has been thoroughly studied, and the results are exceptionally positive; it has been established that when learning together, not only students enhance their social skills, but it also makes them think on a higher level of cognition (Vygotsky, 1978).

In most Asian countries, education was by tradition teacher-centred. Students were not meant to question; they were expected to remember and to recall information when asked as it was thought (Carter, 2006). As in other parts of the world, traditional approaches did not suffice anymore and many countries, including Thailand, reformed their educational methods of instruction to match the 21st century world expectations. In 1999, Thailand triggered some drastic changes and reforms by implementing the National Education Act (NEA). Accordingly, students were encouraged to become critical thinkers, and to acquire information technology knowledge based on the student-centred model (Office of the National Education Commission, 1999). These reforms have socio-constructivist roots, promoting the use of collaborative learning (Hallinger & Kantamara, 2000), and the use of information technology.

Despite allocating more than 20% of its national budget in education (Thailand's budget, 2011), one of the highest in the world, Thailand still shows deficiencies in its educational system. The World Economic Forum's Global Competitiveness Index 2012-2013 placed Thailand 89th for basic education standards and 84th for technological adoption out of 144 countries (Watts, 2013).

Studies on collaborative learning were conducted in Thailand; the results indicated that albeit initiating a more student-centred system by implementing the National Education Act in 1999, cultural aspects were considerably slowing down the introduction of collaborative learning in Thai schools (Deveney, 2005). Thailand's educational system remains by tradition teacher-centred (Carter, 2006), and the transition is not going to be straightforward.

Objectives

The current study had three objectives:

1. To compare the difference among the pre-test and post-test score of the experimental group who studied through collaborative learning.
2. To compare the difference among the pre-test and post-test score of the control group who studied through non-collaborative learning.
3. To compare the difference among the post-test score of the experimental group who studied through collaborative learning with the control group who studied through non-collaborative learning.

Literature Review

The Latin origin of collaboration means to work together. On an educational level, it is the situation where two or more people are trying to learn together by constructing knowledge through learning, helping and questioning each other (Dillenbourg, 1999). This can be achieved synchronously through live debates for instance or asynchronously thanks to the help computers can provide. Advocates of this learning method not only deem that it boosts students' motivation, but also exalts critical thinking and social skills (Totten et al., 1991).

For this research, collaborative learning can be defined as a learning approach which grouped three students, with access to one computer, promoting collaboration among them. To ensure that real collaboration took place, the researcher utilized jigsaw and computer-supported collaborative learning during the ten weeks of instruction.

Proofs of studies on education can be traced as far as Socrates, but the first major learning theory, behaviourism, has its origins in the nineteenth century. Behaviourism was coined by John B. Watson, and is based on the principle that behaviours can be observed, trained and changed (Watson, 1930). Behaviourists perceived the mind as a black box where no cognitive process can be studied. They believe that behaviours are modified through interaction with the environment, and external stimuli as ways of reinforcement. This model of instruction stated that students are passive in the learning process (Pavlov, 1927).

Further studies on children and their development done by Vygotsky and Piaget in the 1920's stressed that learning in a community is vital for children to make connections and sense of what they are learning (Piaget & Inhelder, 1948). Incontestably, communities play a crucial role in giving meanings in the learning process, and students perform on higher cognitive levels when they work collaboratively than when they work alone (Vygotsky, 1978). It was also established that collaboration enables children to shift from egocentrism to sociocentrism (Piaget & Inhelder, 1948). Moreover, Vygotsky, clearly stated in his zone of proximal development (ZPD) which can be defined as the difference between the learning outcomes of students learning alone, and the gain from the interaction of peers more capable that children use higher cognitive skills if they learn in an environment where they share experiences with others (Vygotsky, 1978). The reason is that they perceive meanings of the learning process, and therefore, are inclined to assimilate or incorporate new knowledge faster (Johnson, Johnson & Holubec, 1998); yet again underlining the crucial importance of the community in the learning process.

John Dewey also played a great role in demonstrating the interaction of the learners and their communities, he believed that education was more than rewards and punishments, and that curricula should be developed around students' centres of interests (Dewey, 1964) because this is what fosters intrinsic motivation in students.

Later on, in the beginning of the 20th century, the political instability the world was facing, led to the Second World War; a great amount of specifically skilled soldiers needed to be trained in a short amount of time. Philosophers and Army generals of the United States of America worked together to design models of instruction that would be fast and efficient. They realised that group instruction and collaborative learning were more effective in quantity, quality and overall productivity when compared to working alone (May & Doob, 1937).

Further important studies conducted by British teachers and researchers in the 1950's and 1960's also stressed, and proved, that collaborative learning has undeniable benefits for the community (Bruffee, 1984). In addition, collaborative learning reduces the competition among students which has been proven to have severe negative impacts on their learning process (Coleman, 1961). Collaborative learning became then very popular, and many researchers and theorists started contributing to its development.

In the 1960's as well, Albert Bandura emphasised the reciprocal link between individual's behaviour and the environment (Bandura, 1962). His contribution was that people can learn new information and behaviours by watching other people, as his famous research with the Bodo dolls suggested. He polished and conceptualised his observations with the existing theories, and proposed the social cognitive theory which became then the work of his life. He is one of its main contributors along with the constructivist Jerome Bruner, thanks to the remarkable research done on children's social development (Bruner, 1978). There are three key concepts that define the social learning theory: firstly, people can learn through observation, secondly mental states are important in learning and finally learning does not always lead to a change of behaviour.

In the 1980's the Johnson brothers started comprehensive research on cooperative learning, and in more than 20 years of study, are convinced that collaborative methods of instruction have undeniable benefits for students, teachers, schools and communities (Johnson & Johnson, 1988).

For more than thirty years, collaborative teaching has been extensively practised in classrooms around the world. A lot of positive feedback has been studied and analysed, but those techniques should be utilized specifically when needed, and as tools of differentiated instruction; there are times and places where traditional instruction is required but can be complemented by collaborative learning and reciprocity.

Although the benefits of learning in groups have been demonstrated some time ago, it is only recently in the 1990's, with the emergence of computers in the classrooms, that collaborative learning became very popular, and is in the educational spotlight.

Important Concerns about Collaborative Learning

Some important concerns need to be addressed to maximise the chances of success of collaborative learning. The major problems may rise in the core principle of collaborative learning; working in groups. The teachers have to be careful while creating groups, some students may take their control, and as a result defeat the purpose of the method (McIntosh, 2001). Some students may leave the entire workload on other members, or they may split and complete the task in smaller parts without collaborating. More active students might be reluctant to this method as they see themselves being dragged back by slower students. Racial and gender inequities might also be an important issue when students work collaboratively (Cohen, 1986).

Ideally, students need to feel at ease in their group but also challenged by the task. The groups should be rather small so each student can actively contribute to the global assignment that as to be clearly defined beforehand. Researchers are still debating whether gifted students are being held back by weaker students when working collaboratively (Mills & Durden, 1992). The size of the groups is also in the centre of discussions; groups of three tend to be more productive than larger groups (Slavin, 1987). Teachers should use their common sense, and do their best in creating groups.

Another important variable is teachers; Sharan (2010) stressed that it may confuse and discourage some as they need to evolve continuously. This could cause some unskilled teachers to lose control of their students as they are not ready for their lessons. Teachers need to be trained and well prepared before they make use of collaborative methods of instruction.

Related Studies and Cultural Outlook on Collaborative Learning

The recognized advantages of collaborative learning can all be regrouped under the enhanced cognitive thinking, problem-solving, social skills and motivation that students gain. By exchanging ideas, discussing and debating, students' interest in learning is increased, and it facilitates them to become critical thinkers (Totten et al., 1991).

Collaborative methods of instruction have clear benefits, and should be included in the curriculum as a way of differentiated instruction, but there are cultural aspects that might go against the principles of collaborative learning, and annihilate the benefits they could engender. Countries have their customs and patterns of life that should be respected. Research done by Chylinski (2011) demonstrated that in Germany, students are more formal, competitive and independent, and are reluctant to seek for help. In Ghana, society is based on hierarchical groups from which age and wisdom are essential. The younger generations rarely challenge the older authority. In Abu Dhabi, religion and gender are negatively influencing the emergence of collaborative methods of instruction; for instance, women are not permitted to speak to men other than their husbands. Chinese students favour the traditional approach, and have immense respect for their teachers; they are more competitive than western students. In 2003, Messier suggested in his research that Chinese students attain lower achievement when studying collaboratively. The conclusion of the study of Chylinski was that although there are cultural aspects that

slow down the use of collaborative methods of instruction, all countries are moving towards collaborative learning (Chylinski, 2011).

Collaborative Learning in Thailand

To reform its educational system, Thailand triggered, in 1999, some drastic changes and reforms by implementing the National Education Act (NEA). The intentions of the Thai Ministry of Education innovative but the drastic change they wanted to see would go against the traditional system of Thai education. Sadly there were no guidelines, techniques, advice or recommendations that assisted schools' administrators to implement collaborating learning in the classroom.

The first help to implement collaborative learning in Thailand did not come from the Thai Ministry of Education but from a study conducted by a Thai math teacher. According to her findings, strong preparation is needed to maximise the chance of success which can be regrouped in three main domains; preparation of the teachers, the students and the material being taught (Krongthong, 2003).

In 2004, a study revealed that in Thailand, most teachers gave lectures on topics set by the curriculum in a traditional way. Collaborative methods of instruction were fairly new to Thailand, and go against more preferred traditional teacher-centred approaches. Nevertheless, the study also stated that it was indeed possible to introduce collaborative learning in the Thai educational system but indeed the task will not be easy (Puacharearn & Fisher, 2004).

A great deal of research was then accomplished, and came with negative conclusions based on the observation that generally Thais are perceived as passive students, not used to question teachers, they hardly ever raise hands to ask questions (Deveney, 2005), and therefore, are not prepared to work in groups (Zakaria & Iksan, 2007). This pessimistic assessment would relate Thailand to China, and conclude that collaborative methods of instruction would be ineffective for Thai students (Phuong-Mai, Terlouw, & Pilot, 2005).

A study conducted by the Muban Chombueng Rajabhat University in Thailand came to more positive conclusions; a research demonstrated that clear benefits of implementing collaborative methods of instruction to teach English to secondary Thai students. They take more benefit of their instruction, behave better in their classroom and retain more English (Chayaratheee & Waugh, 2006). Another research conducted by the Rajabhat University in Udon Thani, Thailand, stated that Thai students preferred collaborative methods of instruction for their computer subject (Wanpen & Fisher, 2006).

Different groups of researchers studied what were the reasons of this unenthusiastic turn of events, and referred to the initial conclusions of Krongthong, and stressed the importance of preparations. More than other countries, it is vital that Thai schools put some training facilities in place to ensure that teachers are well prepared (Nuntrakune, Nason, & Kidman, 2009).

A decisive study indicated that the effectiveness of collaborative learning was barely affected by Thai culture; but it was students' attitude and motivation that mostly contribute in the success of the implementation of collaborative learning in Thailand (Bulut, 2010).

As the early studies suggested, the implementation of collaborative learning in Thailand was not straightforward; the fact that no scaffolding came from the Thai Ministry of Education might explain why collaborative learning has not shown faster clear signs of progress in Thailand.

Conceptual Framework

The purpose of this research was to investigate whether collaborative learning had better outcomes than non-collaborative learning for the computer science subject at Saint Joseph Bangna School. This study was conducted on two grade seven classes of the English program over the academic year 2013-2014. These students have two learning cycles. During the first, from grade one to grade six, the students study their computer science subject with a Thai teacher in Thai language. For the second cycle, from grade seven to grade twelve, the students study in English. Both classes of grade seven students started the second cycle, with the researcher as their new teacher.

Both groups studied exactly the same content during the ten weeks of instruction, the only difference being that in the experimental group, the students were studying collaboratively, and in the control group, the students were studying non-collaboratively. The researcher conducted a quasi-experimental study with an experimental group (collaborative learning) and a control group (non-collaborative learning) by comparing the scores for their Microsoft Excel computer science's subject, after their instruction, by running a t-test for significant differences.

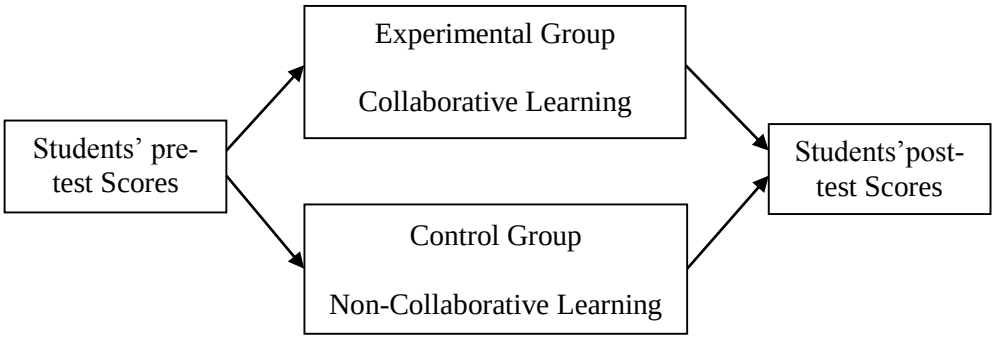

Figure 1: Conceptual Framework of the Study

Method/Procedure

For this study, the researcher instructed the grade seven learners the first eight chapters out of the twenty-one that the whole instruction takes. Therefore the original test of 80 questions was reduced to 25 questions that directly address the curriculum of grade seven students.

The reliability of the test has been determined via Cronbach's alpha coefficient of internal consistency; the value of 0.749 determined the test reliable, since it is greater than the minimum fixed at 0.7 as presented in table 3.

The length of the instruction took ten weeks, from the 3rd of June until the 19th of August 2013, during which, both the experimental and control groups were taught by the instructor.

Each week, both the experimental and control groups had a double period lesson of 50 minutes. Out of the 1.000 minutes of the total time of the instruction, the researcher taught 40-50% of the time, and gave 60-50% time for the students to work in their groups. The material taught during the instruction was the same for the experimental and the control groups. Both groups used the same computer lab on different days, had to submit the same exercises, and were evaluated similarly.

The only difference was in the methods of learning. In the experimental group the students were learning with collaborative methods of instruction, and took part in activities which included jigsaw, computer-supported collaborative learning for Prezi presentations. An essential aspect of the collaborative methods of instruction was to reorganise the classroom in groups of three students sharing only one computer. The researcher preferred the students having only access to one computer to maximise their interactions. Each student took turn behind the computer while the two others were discussing and organising their collaborative work. By limiting the students to one computer, the researcher encouraged collaboration and not cooperation, as it may have happened if each student had access to one computer. Both groups took the same pre-test, prior to the instruction, and post-test, after the instruction.

The first objective; to compare the difference among the pre-test and post-test score of the experimental group who studied through collaborative learning utilized mean, standard deviation, and paired samples t-test one-tailed between the mean of pre-test and the mean of post-test.

The second objective; to compare the difference among the pre-test and post-test score of the control group who studied through non-collaborative learning utilized mean, standard deviation, and paired samples t-test one-tailed between the mean of pre-test and the mean of post-test.

The third objective; to compare the difference among the post-test score of the experimental group who studied through collaborative learning with the control group who studied through non-collaborative learning utilized an independent samples t-test one-tailed between the mean of the post-test score of the experimental group and the mean of the post-test of the control group.

Findings/Results

The first expected outcome was that the post- score of the experimental group who studied through collaborative learning would be higher than the pre-test score. The results conclude that the mean of the pre-test was 8.33, and the mean of the post-test 15.58. Therefore the study strongly suggests that the post-test score of the experimental group who studied through collaborative learning was significantly higher than the pre-test score after the instruction. There was an increase of 87% between the post-test and pre-test score.

Table 1: Experimental Group Paired Samples t-test on Collaborative Learning Approach

Pre-test		Post-test		Paired Diff.	
Mean	S.D.	Mean	S.D.	t Value	Sig. (2- tailed)
8.33	2.48	15.58	3.93	-8.21	0.000

The second expected outcome was that the post-test score of the control group who studied through non-collaborative learning would be higher than the pre-test score. The results conclude that the mean of the pre-test was 9.42, and the mean of the post-test 12.54. Therefore the study strongly suggests that the post-test score of the control group who studied through non-collaborative learning was significantly higher than the pre-test score after the instruction. There is an increase of 33% between the post-test and pre-test score.

Table 2: Control Group Paired Samples t-test on Non-Collaborative Learning Approach

Pre-test		Post-test		Paired Diff.	
Mean	S.D.	Mean	S.D.	t Value	Sig. (2- tailed)
9.42	2.34	12.54	3.93	-4.34	0.000

The third expected outcome was that the post-test score of the control group who studied through non-collaborative learning would be higher than the pre-test score. The results conclude that the mean of the post-test of the experimental group was 15.58, and the mean of the post-test of the control group was 12.54. Therefore the study strongly suggests that the post-test score of the experimental group who studied through collaborative learning was significantly higher than the post-test score of the control group who studied through non-collaborative learning.

Table 3: The Experimental and Control Group Independent Samples on the post-test after Ten Weeks of Instruction

Experimental Group		Control Group		t-test for Equality of Means	
Mean	S.D.	Mean	S.D.	t Value	Sig. (1–tailed)
15.58	3.93	12.54	3.93	3.04	0.01

Discussion

An opening, interesting finding is that both the experimental and the control groups had better post-test score after the instruction than the pre-test; which indicates that both methods of instruction were beneficial for the students. Additionally, the third hypothesis suggests that the post-test score of the experimental group who studied through collaborative learning is significantly higher than the post-test score of the control group who studied through non-collaborative learning. The increase of post-test score compared to pre-test score is 87% for collaborative learning and 33% for non-collaborative learning which reveals that the difference is substantial.

This study also suggests that collaborative learning can be implemented in Thailand for Thai students for the computer subject. This is in contradiction to studies conducted in Thailand that came to pessimistic conclusions stating that Thai students were passive, not questioning their teachers, and not prepared to work in groups, and eventually will make them not ready to study collaboratively (Deveney, 2005; Zakaria & Iksan, 2007; Phuong-Mai et al., 2005). On the contrary the researcher

observed that the students of the experimental group, after an adaptation period, were keener in asking questions as the instruction unfolded. The role of the researcher was determinant in the success of the implementation of collaborative learning. At the start of the instruction very little collaboration took place. The researcher then initiated that collaboration by discussing with students of the groups that needed scaffolding. Consequently the students became involved, and assumed their roles in their groups.

On the other hand this study agrees with the conclusions of a study conducted by the Muban Chombueng Rajabhat University in Thailand, stating that, collaborative learning is achievable in Thailand for Thai students for specific subjects (Chayaratheee & Waugh, 2006). This study also agrees with the conclusions of a study conducted by the Rajabhat University, in Udon Thani, Thailand, stating that Thai students preferred collaborative methods of instruction for their computer subject (Wanpen & Fisher, 2006).

Based on previous studies, the researcher was aware that groundwork was crucial for the success of the implementation of collaborative learning for Thai students in a Thai school, and that the teachers, the students, and the material being taught needed to be prepared (Krongthong, 2003; Nuntrakune et al., 2009).

The researcher who is also the teacher for this study was trained during the completion of his master degree in Education on how to implement collaborative methods of instruction in the classroom. He also researched the topic, and followed guidelines and advice to prepare the instruction.

The aim of the research was explained to the students, what collaborative learning is, and how the roles of the teacher and the students differ from more traditional non-collaborative methods of instruction. The students were grouped by three as a study recommended, and carefully monitored during the ten weeks of instruction (Chanchalort & Kammeungmai, 2011).

The material being taught was also carefully prepared. The instruction covered the basics of Microsoft Excel; which can be grouped as follows, the Microsoft Excel environment, how to work with workbooks, modifying cells, data types, editing data, basic formulas, the fill handle, cells reference and ranges, basic functions, IF, conditional formatting, and recognising error messages. The researcher utilized jigsaw and computer-supported collaborative learning during the ten weeks of instruction. Each group of students had to prepare, and therefore, become specialist of a unit of the instruction, and present to the rest of the class.

In conclusion, we can assume that collaborative learning delivers better results for declarative knowledge for Thai students in their computer subject. The students also gained valuable experience in their social interaction but this aspect was not evaluated in this study. These methods of instruction should be encouraged as they are effective, and are not affected by Thai culture (Bulut, 2010). The key element for the success of the implementation of collaborative learning in Thai schools for Thai students is to have the teachers well prepared and self-confident to be able to challenge the traditional Thai educational system.

Recommendations

This study came to the conclusion that collaborative learning, for the computer science subject, is beneficial for the grade seven Thai students of the English Program at Saint Joseph Bangna School.

Recommendations for Teachers of other Subjects

The findings of this research can be used for the students of the Thai Program at Saint Joseph Bangna School for the same grade level. The computer science teachers from both English and Thai programs could also extrapolate the results, and include collaborative learning in their teaching.

The teachers of other subjects should be cautious if they want to implement collaborative learning for Thai students in Thailand as this study underlined that strong preparation is needed before the instruction takes place. The researcher recommends reading the research done by Nuntrakune and Park as they have prepared scaffolding techniques for teachers teaching Thai students in Thailand, and integrate Thai cultural values in collaborative learning.

Recommendations for Future Research

There are some important factors that affect the findings of this research; and therefore future research should take those points into consideration.

The study has been conducted at Saint Joseph Bangna School, a private all-girls bilingual school, for grade seven students studying in the English program. Saint Joseph Bangna School is a private school run by the Sisters of Saint Paul de Chartres who stress that discipline is an important component of the educational process. The students are well behaved, and mostly come from financially stable families. Saint Joseph Bangna School is an all-girls school with less rivalry or tensions that can be experienced in a mixed gender class. Therefore, the researcher had ideal conditions for the study. Most of the students were diligent, and were eager to work hard for good grades; however Saint Joseph Bangna School implemented a no fail policy that ensures every student of the English Program a minimum grade of 65%. Some students have taken advantage of this practise, and stopped caring about their assessment. The researcher estimates that five percent of the students did not put the attention needed to answer the pre and post-test.

The instruction took ten weeks, and was on the basics of Microsoft Excel for the computer science subject. The sample of this research was small; 48 students from which 24 studied through collaborative learning, and 24 through non-collaborative learning. The evaluation method was a multiple-choice questions test based on a Microsoft Office Specialist (MOS) certification test for the Microsoft Excel software. The researcher preferred memory over performance assessment, and did not include hands-on activities.

Future research for collaborative learning in Thailand could be conducted by modifying various variables; such as research done in rural Thailand, mixed genders classes, larger sample, public schools, longer instructional time, and performance assessment.

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