A COMPARATIVE STUDY OF STUDENT MOTIVATION AND ACADEMIC ACHIEVEMENT IN GRADE 8 SCIENCE UNDER TEACHER-CENTERED AND STUDENT-CENTERED INSTRUCTIONAL METHODS AT TRIAMUDOMSUKSA PATTANAKARN SCHOOL, THAILAND

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Abstract: The purpose of this comparative study was to compare academic achievement and student motivation under teacher-centered and student-centered instructional methods in science grade eight at Triamudomsuksa Pattanakarn School, a government school located in Bangkok, Thailand. A total of 59 students took part in this study over a period of seven weeks. The research involved six objectives. Objectives 1 and 2 were to determine student motivation under teacher-centered and student-centered instructional methods. Objectives 3 and 4 were to determine student academic achievement under teacher-centered and student-centered instructional methods. Objective 5 was to compare student motivation between the two instructional methods. Finally, Objective 6 was to compare student academic achievement under the two instructional methods. The findings of the study suggested that the instructional methods did not differ significantly in terms of student achievement. Student motivation was higher for the student-centered group than the teacher-centered group.

Keywords: Teacher-Centered Instruction, Student-Centered Instruction, Student Motivation, Academic Achievement, Science Teaching.

Introduction

The Thai National Education Act (NEA) B.E. 2542 (1999) Section 22 states that the provision of education should be based on the principle that all students are capable of learning and developing themselves. Teachers providing education should promote all students to be able to develop themselves naturally at their best level (Povatong, 1999). Student-centered education is based on learners who will participate and involve themselves in their own learning. The student-centered approach consists of the idea of self-education which requires teachers to facilitate not deliver, create teaching materials not just use teaching material for providing learners constructive self-learning (Nonkukhetkhong, 2006). Triamudomsuksa Pattanakarn School is a government school in Bangkok, Thailand with approximately 200 teachers and around 5000 students. The researcher concentrated on English program Grade 8 students for the science classes. Most of the teachers generally follow the typical Thai method of teaching and instruction which is the teacher-centered instructional method. As a result, students are not able to experience any peer work, group interaction or group discussion in their classes. A highly teacher-centered instructional method is used throughout the school with maximum teacher talk time.

Objectives

The following were the research objectives for this study.

1. To determine the level of student motivation under teacher-centered instructional method in Grade 8 science at Triamudomsuksa Pattanakarn School.
2. To determine the level of student motivation under student-centered instructional method in Grade 8 science at Triamudomsuksa Pattanakarn School.

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3. To determine the level of student academic achievement under teacher-centered instructional method in Grade 8 science at Triamudomsuksa Pattanakarn School.
4. To determine the level of student academic achievement under student-centered instructional method in Grade 8 science at Triamudomsuksa Pattanakarn School.
5. To determine if there is a significant difference of student motivation between teacher-centered and student-centered instructional methods in Grade 8 science at Triamudomsuksa Pattanakarn School.
6. To determine if there is a significant difference of student academic achievement between teacher-centered and student-centered instructional methods in Grade 8 science at Triamudomsuksa Pattanakarn School.

Literature Review

Teacher and Student-centered Instructional Methods

According to Concordia University (2012), in a teacher-centered classroom the teacher talks and students listen by putting all their attention on the teacher. No collaboration is encouraged and students work individually. In teacher-centered instruction the classroom remains organized, students are not noisy and the teacher has full control over the class. Students work individually so this results in students being more independent. The teacher covers all the important topics because the teacher has control over all the class activities. In a student-centered classroom, students and teacher focus and interact equally. Students work in groups, collaborate and communicate with each other. Through group work students learn communicative and collaborative skills. Students ask questions and direct their own learning. Students also interact actively with each other and perform leaning activities with enthusiasm. Thai teachers in recent years are using more student-centered instruction methods in their classrooms. This is likely because, as discussed above, both the National Education Act (1999) and the Basic Core Curriculum introduced in 2008 emphasized the student-centered approach to teaching and learning. However, when both the teacher-centered and student-centered approaches are used together in class, students can enjoy and get the benefits from a balance of both educational atmospheres (Concordia University, 2012). This combined dual approach recognizes the importance of Thai social and cultural imperatives that historically have tended to emphasize authoritative approaches to teaching and learning while at the same time providing grounds for the modern student-centered international approach.

Teacher-centered Instruction

Traditional instruction is usually the teacher-direct orientation which has long been implemented as a main method of instruction in Thailand. This method of instruction emphasizes rote learning. Knowledge is transmitted from teacher to students where the teacher has total control and controls what students learn.According to Thamraksa (2011), many teachers are not open to new teaching methods, as they do not wish to move out of their comfort zones and do something new. Also, teachers have a perception that their teaching methods are already the best and therefore require no change. Some students consider traditional instruction as evidence that they are really being taught in school (Thamraksa, 2011).

Student-centered Instruction

Student-centered instruction is a teaching strategy in which students are given more attention and more responsibility for their own learning. Student-centered instruction includes techniques like active learning, problem solving using creative and critical thinking, role playing and team learning such as cooperative learning. According to Froyd and Simpson (2008), proper teaching using Student-centered instruction can increase student motivation to learn, in-depth understanding of content and an overall positive attitude for the subject. Student-centered instruction provides students with an opportunity to discover and construct knowledge. Many approaches of student-centered instruction have been developed, among them, collaborative learning and experiential learning.

Collaborative Learning

Collaborative learning is the interaction among students, where they work together towards a common goal. Collaborative learning happens in an interactive learning environment. Students learn because they work together and perform activities through collaborating which triggers learning. The teacher's

role is as a facilitator, where the teacher leads the way through hints in order to make the group work productive and monitor the students who are lagging behind and are not interacting (Dillenbourg, 1999).

Experiential Learning.
Experiential learning theory states that learning is created through experience and is based on four stages of the learning cycle which are experience, observation, conceptualization and testing which will lead to new experiences (Clark, 2014). Knowledge is created by gaining experience and conversion of experience into thought and action through reflection. Learning is the main cause of human development and aids in personal development. Experiential learning is the construction of knowledge through experience, reflection, thinking and action (Yeganeh & Kolb, 2009).

Motivation for Learning Science
Motivation is the key to the performance of all learned behavior. Learned behavior happens because it is activated through motivation. The subscale task value in the Motivated Strategies for Learning Questionnaire – MSLQ (Pintrich, Smith, Garcia & McKeachie, 1991) is related the students evaluation on how useful and important the task given is. Intrinsic goal orientation refers to students participation to the task given in class whereas extrinsic goal orientation refers to the level at which student is participating in the task for good grades and rewards (Kivinen, 2003). Self- efficacy for learning and performance is the students' strong belief on how well they can perform at school and learn. Control of learning beliefs refers to students' belief that the hard work put in by them will give positive results. Self-efficacy for learning and performance refers to the belief of the student to successfully complete a task and the confidence in the skills to complete that task given (Pintrich et al.1991).

Triamudomsuksa Pattanakarn School English Program (TUP EP)
Triamudomsuksa Pattanakarn School English Program has been functioning successfully since 2013 and currently has Mathayom 1 to 5. The classrooms have a modernized pattern of structure with air conditioners, projectors and laptops for teachers to access and use in their lessons. There are 15 teachers from various countries for example, Philippines, USA, and India, in the English Program. Triamudomsuksa Pattanakarn School's mission also wants teachers to create an environment that has a high level of student involvement. The English Program teachers provide students with a new approach to their teaching and therefore help to motivate the students for a higher level. The English Program aims to provide students with international academic standards while also respecting Thai culture (Vinrade, 2016).

Conceptual Framework
The conceptual framework displays the research design of this study. The independent variables are teacher-centered and student-centered instructional methods. The dependent variables are student achievement and student motivation, which were measured independently for the two instructional methods at the end of the teaching and learning period. The conceptual framework of this study is illustrated in Figure 1.

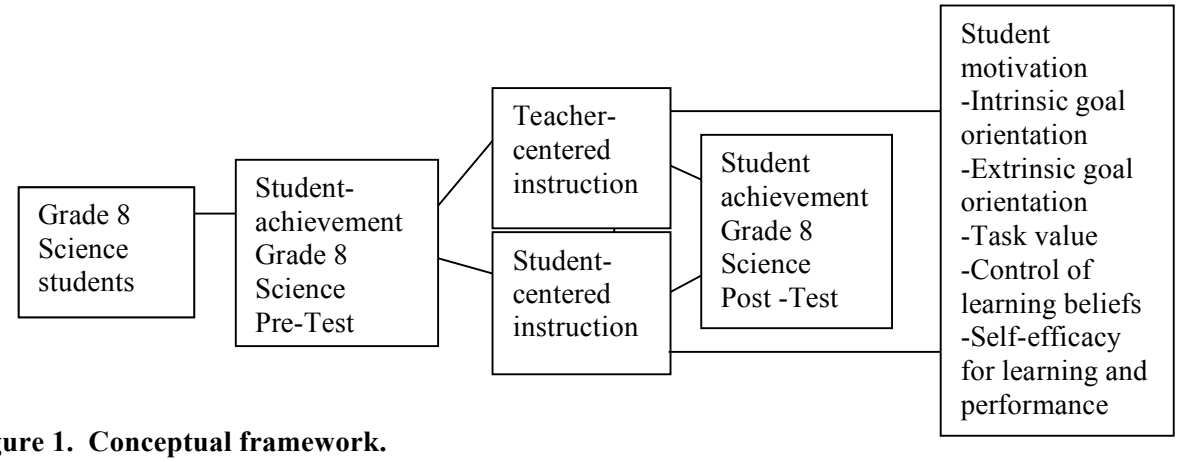

Figure 1. Conceptual framework.

Method

This comparative study used a quantitative approach as it used pre-test and post-test to compare student academic achievement under two different instructional methods. Also, the researcher will use a questionnaire to measure the level of motivation of students in each of the two instructional methods. This research used two groups of students. The control group followed the teacher-centered instructional method usually used by the school. The experimental group was provided with student-centered instructional method, so the treatment in this study was collaborative learning in which students work in groups.

The teacher controlled the teacher-centered group and student did not get to participate or do any activities, which was different from the student-centered group where the students worked in groups together and did many activities and discussions together. The independent variables were teacher-centered instructional method and student-centered instructional method. The dependent variables were student academic achievement and level of motivation.

Population and Sample

The population was the 59 students enrolled in Grade 8 English Program science class at Triamudomsuksa Pattanakarn School. The sample was all of the 59 students. The sample was a purposive research sample divided into two groups, a control group of 30 students and an experimental group of 29 students.

The English Program has separated students of Grade 8 into two sections only 2/15 and 2/16. Both sections were capable of performing good work and activities in the class at the same level. Given that the researcher had asked the head of the English program that both the sections are initially academically at the same level, the researcher will simply choose 2/15 to be the control group and 2/16 to be the experimental group

Research Instrument

Two research instruments – pre-post achievement test and the Motivation for Learning Science Questionnaire (MLSQ) were used throughout the research. The first instrument was a test prepared by the researcher consisting of 15 multiple choice questions, five true or false, and 10 fill in the blanks which rendered a total point value of 30 points.

This test had been used previously by the researcher in other classes for test purposes and was checked and approved by science teachers in the science department at the research school. The pre- and post-tests was used to determine the academic achievement of the two groups. The interpretation from the pre-test and post-test percentage of marks of the student achievement was as Table 1 indicates.

Table 1: Interpretation of Student Achievement

Percentage of marks	Interpretation
80 – 100	Excellent
75 - 79	Very Good
70 - 74	Good
65 - 69	Moderate
60 - 64	Satisfactory
55 - 59	Low
50 - 54	Poor
0 - 49	Failing

The second instrument was a seven-point Likert-type- scale, the Motivation for Learning Science Questionnaire (MLSQ) which was adapted from the Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich et al. (1991).The subscales used in this questionnaire were intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs and self-efficacy for learning and performance.

The researcher used the same scale as the original questionnaire of MSLQ developed by Pintrich et al (1991) with minor modification to have each item refer to science class. Table 2 presents the variables and the items measuring them in the instrument.

Table 2: MLSQ Items and Relevant Subscales in Terms of Learning and Performance

Subscales	Items
Intrinsic goal orientation	1, 13, 18, 20
Extrinsic goal orientation	6, 9, 11, 25
Task value	3, 8, 14, 19, 22, 23
Control of learning beliefs	2, 7, 15, 21
Self-efficacy for learning and performance	4, 5, 10, 12, 16, 17, 24, 26

According to the Objective 1, the researcher determined the level of motivation of students through the questionnaire. Table 3 indicates the interpretation of the motivation scores.

Table 3: Interpretation Scores of the MLSQ

Score	Interpretation
5.81 - 7.00	Very high motivation for learning science
4.61 - 5.80	High motivation for learning science
3.41 - 4.60	Moderate motivation for learning science
2.21 - 3.40	Low motivation for learning science
1.00 - 2.20	Very Low motivation for learning science

Validity and Reliability

The pre and post-test had been used for 3 years by the researcher for Grade 8 science. The test was checked by the head of the school science department and science co-teachers for the content validity. Also, the English grammar was checked by the head of the English department at the school. The scales in the Motivated Strategies for Learning Questionnaire represent a coherent conceptual and empirically validated framework in assessing student motivation. Studies have supported the factor structure of MSLQ and the stability of the scales (Pintrich et al.1991).

The reliability of the MLSQ can be determined from the Cronbach's alpha values for each subscale as shown in Table 4.

Table 4: Specifications of the Sub-Scale of the Items and Cronbach's Alpha Value in the MLSQ

Sub-scale	Cronbach's alpha value by Pintrich et al. 1991	Cronbach's alpha value in this study
Intrinsic goal orientation	.74	.72
Extrinsic goal orientation	.62	.63
Task value	.90	.85
Control of learning beliefs	.68	.59
Self-efficacy for learning & performance	.93	.89
Total	.77	.74

Collection of Data

The collection of data was conducted during a period of six weeks, with three 50-minute lessons per class in each of those weeks during August to September 2017. The data was collected by the researcher. The topic was taught at the same time to both groups. The only difference was the style in which the instruction was delivered.

Data Analysis

The six objectives of the study were analyzed using a statistical software package. The results were compared to each other through independent samples *t*-test. For Objectives 1 and 2, means and standard deviations were computed to determine the levels of student motivation under each instructional method. For Objectives 3 and 4, means and standard deviations were computed to determine the levels of academic achievement in the pre- and post-tests. For Objectives 5 and 6, independent samples *t*-tests were used to determine if there were significant differences between the two groups in terms of motivation and academic achievement.

Findings

Research Objective 1

The first objective was to determine the level of student motivation under teacher-centered instructional method in Grade 8 science at Triamudomsuksa Pattanakarn School. This finding is presented in Table 5.

Table 5: Mean and Standard Deviation of the Control Group Motivation for Learning Science Questionnaire MLSQ

Teacher-centered Instruction	***M***	***SD***	**Interpretation**
Motivation for Learning Science Questionnaire (MLSQ)	4.89	.76	High motivation for learning science

Note. N=30.

The analysis revealed a mean score of the MLSQ in the 4.61 to 5.80 range, thus displaying that the control group had high motivation for learning science (n=30, M= 4.89, SD= .76). The mean and standard deviation of each subscale for the control group are shown in Table 6 below.

Table 6: Means, Standard Deviations and Interpretations of the Subscales of the Motivation for Learning Science Questionnaire MLSQ items for Control Group

Subscale	Item number	*M*	*SD*	Interpretation
Intrinsic goal orientation	1,13,18,20	4.54	.95	Moderate
Extrinsic goal orientation	6,9,11,25	5.54	1.05	High
Task value	3,8,14,19,22,23	4.89	1.1	High
Control of learning beliefs	2,7,15,21	5.16	.91	High
Self-efficacy for learning and performance	4,5,10,12,16,17, 24,26	4.32	.87	Moderate

Note. N=30.

Research Objective 2

The second objective was to determine the level of student motivation under student-centered instructional method in Grade 8 science at Triamudomsuksa Pattanakarn School. This information is given in Table 7.

Table 7: Mean and Standard Deviation of the Experimental Group Motivation for Learning Science Questionnaire MLSQ

Student-centered instruction	*M*	*SD*	Interpretation
Motivation for Learning Science Questionnaire (MLSQ)	5.30	.73	High motivation for learning science

Note. N=29.

The analysis revealed a mean score of the MLSQ in the 4.61 to 5.80 range, thus displaying that the experimental group have high motivation for learning science (*n*=29, *M*= 5.30, *SD*= .73). The mean and standard deviation of each subscale of the motivation for learning science questionnaire for the experimental group are shown in the Table 8 below.

Table 8: Means, Standard Deviations and Interpretations of the Subscales of the Motivation for Learning Science Questionnaire MLSQ items for Experimental Group

Subscale	Item number	*M*	*SD*	Interpretation
Intrinsic goal orientation	1,13,18,20	5.16	.98	High
Extrinsic goal orientation	6,9,11,25	5.53	.97	High
Task value	3,8,14,19,22,23	5.35	1.05	High
Control of learning beliefs	2,7,15,21	5.55	.87	High
Self-efficacy for learning and performance	4,5,10,12,16,17, 24,26	4.94	.89	High

Note. N=29.

Research Objective 3

The third objective was to determine the level of student academic achievement under teacher-centered instructional method in Grade 8 science at Triamudomsuksa Pattanakarn School. This information is given in Table 9.

Table 9: Mean and Standard Deviation of the Control Group Pre-Test and Post-Test

Teacher-centered Instruction	*M*	*SD*
Pre-test	16.40	3.55
Post-test	24.97	3.66

Note. N=30.

In the pre-test the control group scored low which was 54.67% (*n*=30, *M*= 16.40, *SD*=3.55). In the post-test the control group scored excellently which was 83.23% (*n*=30, *M*= 24.97, *SD*=3.66).

Objective Four

The fourth objective was to determine the level of student academic achievement under student-centered instructional method in Grade 8 science at Triamudomsuksa Pattanakarn School. This information is given in Table 10.

Table 10: Mean and Standard Deviation of the Experimental Group Pre-test and Post-Test

Student-centered instruction	*M*	*SD*
Pre-test	16.17	2.99
Post-test	23.86	3.78

Note. N=29.

In the pre-test the experimental group scored poorly which was 53.9% (*n*=29, *M*= 16.17, *SD*=2.99). In the post-test the experimental group scored excellently which was 79.53% (*n*=29, *M*= 23.86, *SD*=3.78).

Objective Five and Hypothesis 1

The fifth objective was to compare student motivation between teacher-centered and student-centered instructional methods in Grade 8 science at Triamudomsuksa Pattanakarn School. An independent samples *t*-test (one-tailed) was used for the analysis. The mean and standard deviation of each subscale of the MLSQ for the control and experimental group together are shown in Table 11 below.

Table 11: Means, Standard Deviations and Interpretations of the Subscales of the MLSQ items for both Groups

Subscale	Item number	*M*	*SD*	Interpretation
Intrinsic goal orientation	1,13,18,20	4.84	1.01	High
Extrinsic goal orientation	6,9,11,25	5.53	1.0	High
Task value	3,8,14,19,22,23	5.11	1.09	High
Control of learning beliefs	2,7,15,21	5.35	.91	High
Self-efficacy for learning and performance	4,5,10,12,16,17 ,24,26	4.62	.93	High

Note. N=59.

The means and standard deviations were analyzed and compared as detailed in Table 12 below.

Table 12: Independent Samples t-Test (One-Tailed) of the Motivation for Learning Science Questionnaire MLSQ

Control group and experimental group MLSQ	*N*	*M*	*SD*	*df*	*t*	Sig.(2-tailed)
	59	5.09	.77	57	-2.13	.038

This objective was directly linked to the first hypothesis. In this case, the first hypothesis was accepted as the analysis concluded that, there was a significant difference in student motivation between the two instructional methods with the control group (*n*=30, *M*= 4.89, *SD*= .76) and the experimental group (*n*=29, *M*= 5.30, *SD*= .73) condition; *t* (57) = -2.129, *p*= .038.

The experimental group which experienced the student-centered learning instructional method was overall significantly highly motivated with the instructional method than the control group.

Objective Six and Hypothesis 2

The last objective was to compare students' achievement between teacher-centered and student-centered instructional methods in Grade 8 science at Triamudomsuksa Pattanakarn School. As previous research showed an improvement in favor of student-centered learning method, an independent samples *t*-test (one-tailed) was used for the analysis. Table 13 presents the analysis of the means and standard deviations.

Table 13: Independent Samples t-Test (One-Tailed) of the Post-Test

Control group and experimental group post-test	*N*	*M*	*SD*	*df*	*t*	Sig.(2-tailed)
	59	24.42	3.73	57	1.14	.259

This objective was directly linked to the second hypothesis. In this case, the second hypothesis was rejected as the analysis concluded that, there was no significant difference in achievement between the two instructional methods with the control group (n=30, M= 24.97, SD=3.66) and the experimental group (*n*=29, *M*= 23.86, *SD*=3.78) condition; t (57) = 1.141, p = .259

Discussion

Student Motivation

In terms of this research, the researcher was pleasantly surprised that the Thai students had high motivation towards learning science. The experimental group which experienced the student-centered learning instructional method was highly motivated with the instructional method in Grade 8 science class compared to the control group. Students in the experimental group participated actively and were more engaged in classwork within their groups than the students in the control group. According to Froyd and Simpson (2008), proper teaching using student centered learning can increase student motivation to learn, in-depth understanding of content and an overall positive attitude for the subject. SCL provides students with an opportunity to discover and construct knowledge.

Academic Achievement

The researcher was surprised again that the student-centered method did not lead to a significant difference in terms of student achievement. The time frame in which the research took place was likely too short to bring about significant differences in motivation and achievement. The time span in which the study was conducted was 6 weeks and made it difficult to bring a powerful impact in the students' academic achievement by the two different instructional strategies. With the researcher's experience of working at Triamudomsuksa Pattanakarn School for five years, the researcher has observed that Thai students are used to the teacher-centered method of instruction because the students have been only given teacher-centered instruction in the previous years at this school with the teacher being the main source of instruction and the leader in class. The student-centered instructional method for some teachers is something new where they are not sure of the ways in which they can apply and use it in their classes. They also may fear that a student-centered instructional method will replace them in classroom in the long run (Thamraksa, 2011). In conclusion, the students in the experimental group showed a high level of motivation in class. With more time and more improved preparations along with a larger sample size it is the researcher's belief that the academic achievement would increase significantly through student-centered instruction method.

Recommendations

The recommendations of this study are for the administrators and teachers at Triamudomsuksa Pattanakarn School as well as future researchers interested in conducting similar studies.

Recommendations for the Administrators

The school administrators should encourage training for teachers to understand and learn new methods for implementing student-centered instructional methods in their classroom in compliance with the NEA and the Basic Core Curriculum. The administrators should encourage teachers to implement student-centered class activities and environment in their classrooms so that students are not restricted to teacher-centered methods all the time.

Recommendations for the Teachers

Teachers who wish to implement student-centered instruction should be aware that the approach requires proper planning and preparation before the instruction begins in class. Students at Triamudomsuksa Pattanakarn School are more used to the teacher-centered method of instruction so it requires time for

students to adapt new instructional methods. Teachers should begin encouraging students to work in groups in order to create student-centered environment in classrooms. Teachers should also create a culture of student-cooperation in classrooms. Teachers should be willing to go student-centered in their classrooms.

Recommendations for Future Researchers

Researchers who wish to research on this topic should be well prepared to create a student-centered environment in class. Researchers should have larger sample sizes to get better results. Researchers should conduct the research for a longer time span in order to implement the instructional method effectively and get more useful outcomes. Researchers should also try to go for more schools to conduct the research and obtain results.

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