The Effects of Cooperative Learning on the Academic Achievement and Knowledge Retention

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Abstract

This experimental study investigated the effects of cooperative learning on the achievement and knowledge retention of 110 first-year primary education students toward the psychology subject over the eight weeks of instruction at An Giang University. These tertiary students were divided into two matched groups of 55 to be taught by the same lecturer. In the experimental group, cooperative learning was employed, while in the control group, lecture-based teaching was used. The results showed that after approximately 8 weeks students who were instructed using cooperative learning achieved significantly higher scores on the achievement and knowledge retention posttestsththan did students who were instructed using lecture-based teaching. The study supports the effectiveness of cooperative learning in Vietnamese higher education.

Keywords: Cooperative learning, Learning together, Academic achievement, Knowledge retention

1. Introduction

In recent years, studies involving cooperative learning, one kind of student-centered approach have emerged as an internationally important area of social science research among researchers (Slavin, 2011). Many studies have been conducted in different settings of education, using different kinds of cooperative learning techniques. Such techniques are Learning Together (LT), Jigsaw Grouping, Teams-Games-Tournaments (TGT), Group Investigation (GI), Student Teams Achievement Division (STAD), and Team Accelerated Instruction (TAI). A series of research studies has found a appreciate relationship between the higher cognitive and affective outcomes, and cooperative learning approaches (Johnson & Johnson, 2005; Tran & Lewis, 2012a; Tran & Lewis, 2012b). In the setting of Vietnamese higher education lecture-based teaching, one kind of traditional approach has been still the most prevalent instructional approach (MOET, 2009; Harman & Nguyen, 2010). In comparison with cooperative learning techniques, lecture-based teaching has been reported to be less effective to the demands of high rates of cognitive and affective outcomes (Slavin, 2011). In order to improve students' cognitive outcomes, an alternative to lecture-based teaching could be cooperative learning (Tran & Lewis, 2012a&b). This approach has been reported to improve students' achievement, and their knowledge retention (Johnson & Johnson, 2009).

Cooperative learning comprises "instructional methods in which teachers organize students into small groups, which then work together to help one another learn academic content" (Slavin, 2011, p.344). Cooperative learning consists of five basic elements: positive interdependence, promotive interaction, individual accountability, teaching of interpersonal and social skills, and quality of group processing. Learning situations are not cooperative if students are arranged into groups without positive interdependence (Johnson & Johnson, 2009). Positive interdependence means that in cooperative learning situations, students are required to work together as a cohesive group to achieve shared learning objectives (Yager, 2000). In the process, students must be responsible for their own learning and for the success of other group members' learning (Slavin, 2011). In other words, students must ensure that other members in their group complete the tasks and achieve the academic outcomes. The lesson will not be cooperative if students do not *"swim together"* in the group learning activities (Johnson & Johnson, 2008). Hence, positive interdependence needs to be constructed in cooperative learning groups to help students work and learn together. Positive interdependence results in reciprocal interaction among individuals, which promotes each group member's productivity and achievement. Promotive interactionoccurs as individuals encourage and facilitate each other's efforts to accomplish the group's goals. In cooperative learning groups, students are required to interact verbally with one another on learning tasks (Johnson & Johnson, 2008). As part of the cooperative learning condition, students are

required to interact verbally with one another on learning tasks (Johnson & Johnson, 2009), exchange opinions, explain things, teach others and present their understanding (Johnson, 2009). Individual responsibility means that students ask for assistance, do their best work, present their ideas, learn as much as possible, take their tasks seriously, help the group operate well, and take care of one another (Johnson, 2009). Positive interdependence is recognized to create *"responsibility forces"* that increase the individual accountability of group members for accomplishing shared work and facilitating other group members' work (Johnson & Johnson, 2005). If there is no individual accountability, one or two group members may do all the work while others do nothing. If the achievement of the group depends on the individual learning of each group member, then group members are motivated to ensure that all group members master the material being studied (Slavin, 1996). When group accountability and individual accountability exist in the group, the responsibility forces increase (Johnson & Johnson, 2009). In reality, students cannot work effectively if socially unskilled students are arranged into one group (Johnson & Johnson, 2006). If basic learning skills on cooperative interaction are not taught, group members cannot work together effectively to finish their tasks. Cooperative learning, compared with individualistic or competitive learning, is more complex because it requires students to engage in learning tasks and work together (Johnson & Johnson, 2005). Therefore, social and interpersonal skills, such as listening attentively, questioning cooperatively and negotiating respectfully need be taught, to help students cooperate effectively in the group. In addition, each group member should know how to manage the group, how to make decisions and how to solve conflicts that arise among group members. If these skills are not taught, cooperative learning activities are rarely successful (Slavin, 1996). To coordinate efforts to achieve mutual goals, participants must: (a) get to know and trust each other; (b) communicate accurately and unambiguously; (c) accept and support each other; and (d) resolve conflicts constructively (Johnson & Johnson, 2009). Group processing is defined as reflecting on a group session to help students: (1) describe what member actions were helpful and unhelpful; and (2) make decisions about what actions to continue or change (Johnson & Johnson, 1999). Group processing helps improve the effectiveness of the members in contributing to the shared efforts to achieve the group's goals via reflection on the learning process (Yamarik, 2007). In other words, the purpose of group processing is to clarify and improve the effectiveness of the members in contributing to the joint efforts to achieve the group's goals. In summary, if these basic elements of cooperative learning are included in cooperative learning groups, students achieve better, demonstrate superior learning skills (Johnson & Johnson, 2008), and experience more positive relationships among group members, and between students and the teacher, and more positive self-esteem and attitudes toward the subject area (Slavin, 2011).

In all levels of education students in cooperative situations achieved greater academic, social and psychological benefits (Johnson & Johnson, 2005). Specifically, cooperative learning has been reported to improve students' academic achievement (Beck & Chizhik, 2008; Sousa, 2006; Zain, Subramaniam, Rashid & Ghani, 2009). For example, one study of the Jigsaw II and GI effect among 98 elementary school students in social studies, lasting 12 weeks in America (Lampe, Rooze, & Tallent-Runnels, 1996), indicated that students in the experimental group had higher academic achievement ($p < .001$) than those in the control group (effect size [ES] = 0.84). Whicker, Nunnery, & Bol (1997) compared the effects of STAD and traditional teaching methods on academic performance of 11^{th} and 12^{th}grade students in a mathematics course in America. The results from the posttests showed that students in the cooperative learning group achieved significantly ($p < .05$) higher posttest scores than did students in the comparison group (ES = 0.87). Similarly, a two-group experiment reported by Yamarik (2007), investigated the jigsaw effects on the achievement of 116 American tertiary students in a 2-semester period. Results obtained from multivariate regression analysis reveal that the jigsaw group significantly outperformed the comparison group on the posttest scores (ES = 0.01). In a 5-week experimental study on science achievement of 68 eighth-grade Turkish students (Kose, Sahin, Ergun, & Gezer, 2010), the results of t-tests indicated that students in the treatment group significantly outscored ($p < .05$) students in the control group on the post-achievement test (ES = 1.26). In addition, the other two experimental studies (Kilic, 2008; Doymus, Karacon, & Simsek, 2010) utilized the pretest and posttest with control group design to investigate the effects of jigsaw learning on student achievement. The former was conducted with the participation of 80 Turkish tertiary students in a Principles and Methods of Teaching course over a 7-week period. The latter was carried out with 73 Turkish tertiary students in a Chemistry course over a one-year period. At the end of the experiment, the former shows that the jigsaw group had higher posttest achievement scores ($p < .01$) than the control group (ES = 1.13). The latter reports that the jigsaw group significantly outperformed ($p < .001$) the traditional learning group (ES = 2.62). Similarly, Beck & Chizhik (2008) compared the effects of cooperative learning and other teaching methods on 71 tertiary student performances in a computer science course in America over a period of one year, and found that the cooperative learning group achieved significantly higher ($p < .01$) than the conventional lecture teaching group.

As indicated above, students perform better with cooperative learning than they do with alternative forms of instruction, as reported in the above studies, which further confirms the results of several previous reviews of cooperative learning research (Slavin, 1996; Johnson & Johnson, 1989). These studies were conducted at various levels of education, in different subject areas, and in different countries. For example, in an extensive review of over 375 studies yielding 1,691 findings conducted by Johnson & Johnson (1989), reported that

> *When all of the studies were included in the analysis, the average student cooperating performed at about two-thirds a standard deviation about the average student learning within a competitive (effect size = 0.67) situation or individualistic (effect size = 0.64) situation. When only high-quality studies were included in the analysis, the effect sizes were 0.88 and 0.61 respectively* (p.38).

In promoting greater achievement, some additional studies reported that cooperative learning also fosters greater retention of learning, as indicated by students' results on delayed achievement tests (Sousa, 2006). For example, Sousa (2006) reports the average percentage of learning material retention after 24 hours when students were taught by different teaching methods. He indicates that there is retention of 50% of material learned in the discussion group, 75% as a result of requests for students to study through practice, and 90% when students teach others. In addition, Moore (2008) reports studies showing that a blend of *'telling'* and *'showing'* techniques results in greater retention (65%) after three days. It is therefore argued that the best way to learn something effectively is to prepare to teach it. In other words, whoever explains, learns (Sousa, 2006). Teaching others and elaborating ideas are the main features of cooperative learning (Kagan & Kagan, 2009; Slavin, 2011). The nature of cooperative learning is learning by doing and elaborating(Liang, 2002). In cooperative learning situations, the concepts being taught are often elaborated (O'Donnell, 2000). The consistent elaboration of learning concepts provides students who either receive the explanation or those who give the explanation with a deep understanding and a more complete retention of the concepts being learnt for a longer period of time (Chianson, Kurumeh & Obida, 2010). Consequently, as has been shown in the above review, in cooperative situations, students retain more knowledge when they offer more explanation and elaboration to others (Zakaria, Chin, & Daud, 2010; Webb, 2008; Johnson & Johnson, 1989).

Some studies have reported the effects of different forms of pedagogy on retention of learning. For example, an impressive study lasting 4 weeks was conducted by Tanel & Erol (2008) in which the effectiveness of the jigsaw learning method and conventional teaching method were compared on achievement and retention in a Physics course in a University in Turkey. An experimental group received the jigsaw technique and a control group received traditional teaching. At the end of the treatment, a posttest was administered, while the delay-test was administered 4 weeks after the treatment. The posttest and delay test mean scores of the jigsaw group were significantly higher ($p < .05$) than those of the control group. Results from the t-tests indicated that there were significant differences ($p < .001$) on the posttest scores (ES = 1.24) and the delayed-test achievement scores (ES = 1.96). The experimental students had greater achievement and long-term achievement than those in the control group. An inspection of posttest scores and delay test scores for each group shows that four weeks after the experiment the students in the experimental group retained nearly 98% of their knowledge on the delay test whereas those in the control group retained nearly 80 percent. Sahin (2010) also used a pretest and posttest design to investigate the effects of Jigsaw III on achievement, and retention, of 71 Turkish sixth-grade students in a Turkish course over a 6-week period. Results from the t-tests indicated that students in the jigsaw group outscored on the achievement test ($p < .001$) those in the traditional lecture-based learning group (ES = 0.86).The jigsaw group also had greater long-term achievement on the delay test ($p < .05$) than those in the control group (ES = 0.69). Wyk (2010) examines the effects of GTG on the achievement and knowledge retention of 110 economics education students in South Africaover 12 weeks of instruction. The results show that the posttest and delay test mean scores of students in the GTG were higher than those of students in the conventional teaching group. The findings of the above studies validate the results of a two-week period conducted by Abu & Flowers (1997) in which the effectiveness of the STAD method and lecture-based teaching method were compared on two dependent variables (achievement, and retention) in a home economic course in a University in America. A cooperative learning group received the STAD technique and a control group received conventional teaching. At the end of the treatment, a posttest was administered, and a delaytest was administered 3 weeks after the treatment. Results show that the students in the STAD group had higher post-test and delay test scores than those in the conventional teaching group. In summary, the review of the above studies, some additional studies on cooperative learning in some Western countries, and some reviews and meta-analytic studies examined above, supports the effectiveness of cooperative learning on students' academic achievement and long-term achievement, as well as knowledge retention.

Although there is research which indicates that students from collectivistic Asian cultures value working in groups, and perform well in groups (Hofstede & Hofstede, 2005), it is necessary to systematically examine the extent to

which cooperative learning works and affects students' learning, where Confucianism has a powerful influence on norms, values, and behavior of learners (Nguyen, Terlouw, Pilot, & Elliott, 2009a&b). In a one-semester study of the effects of STAD and Learning Together on 70 Taiwanese secondary school students' oral communicative competence in English and their attitudes, Liang (2002) reported that students in the experimental group had significantly higher performance scores ($p < .05$) than those in the control group. Hwang, Lui, & Tong's findings (2005) supported this result when they utilized a 2 x 2 between-subjects experimental design to examine cooperative learning effects on the learning outcomes of 172 accounting students in a major Hong Kong university. Results show that the students in the cooperative learning group performed better in answering indirect application-type questions than those in the traditional lecture group. The posttest scores of the cooperative learning group were significantly higher than that of the control group. Similarly, the effects of STAD and traditional lecture teaching on the academic performance of tertiary students in an English course in Taiwan were compared by Cheng (2006). Results show that students in the cooperative learning group achieved significantly higher ($p < .05$) on posttest scores than students in the traditional lecture teaching group. In addition, a two-group experimental design, Luu (2010) investigated the Learning Together effects on the reading competence of 77 Vietnamese tertiary students over a 7-week-period. Results show that the small cooperative learning group outperformed ($p < .05$) the comparison group on the posttest scores in reading competence.

However, some recent studies in Asian contexts show that cooperative learning is no better than, or worse than lecture in its effects on students' learning. For example, in a two-semester study on linguistic competence achievement and attitudes of 21 secondary school students in Hong Kong, Eva (2003) reported that there were no significant differences ($p > .05$) on linguistics competence between the treatment group and the control group. The other two experimental studies (Chung, 1999; Sachs, Candlin, Rose, & Shum, 2003) also show there were no significant differences ($p > .05$) in achievement between the experimental students and the control students. The former was conducted with the participation of 23 primary school students in a mathematics course in Hong Kong in a one-semester period. Results show that there were no significant differences ($p > .05$) on mathematics achievement between the treatment group, where TAI was employed, and the control group, where whole-class traditional teaching was used. The latter was carried out with 120 primary school students in an English course in a one-year period. The findings reveal no significant differences ($p > .05$) in oral performance scores between students in small cooperative learning groups and in traditional lecture teaching groups. Similarly, Zain, Subramaniam, Rashid, Shani (2009) investigated the STAD effects on achievement of 61 Malaysian tertiary students in an Economics course of a one-semester duration, and reported that there was no significant difference ($p > .05$) on posttest achievement scores between the STAD group ($n = 31$) and the traditional teaching group ($n = 30$). The review also shows that in two studies, students in the traditional lecture-based groups significantly outperformed ($p < .05$) those in the cooperative learning groups. Specifically, Messier (2003) compared the effects of cooperative learning and the traditional lecture teaching on 95 secondary school student on grammar performances in an English course in China over a period of 4 weeks. There were four experimental groups, and four control groups. Results show that achievement scores in the conventional lecture teaching groups were significantly higher ($p < .05$) than in the small cooperative learning groups. Another study (Tan, Sharan, & Lee, 2007) lasting six weeks, conducted in Singapore, had similar findings. The study compared the impact of the GI method and a conventional teaching method on secondary school students' achievement in Geography. The study reported that students in two traditional lecture-based teaching groups significantly outperformed those in two treatment groups.

This review confirms, to some extent, the findings of Thanh-Pham, Gilles, & Renshaw (2008), who conducted a review of 14 studies on cooperative learning in the Asian context. They identified 14 high-quality studies that compared the impact of cooperative learning and traditional lecture-based teaching on student achievement, and reported that 7 studies showed significantly higher achievement in the treatment groups than in the control groups, 4 revealed the control groups outperformed the treatment groups, and 3 showed no significant differences. This ratio may challenge, to some extent, the results of those studies reviewed earlier which reported the positive effects of cooperative learning in the Western context. It is a common finding in Western research (e.g. Johnson & Johnson, 2009; Slavin, 2011) that cooperative learning provides greater achievement than competitive or individualistic learning. In summary, the benefits of cooperative learning have been shown in numerous studies in the Western context, while in the Asian context [including Vietnam], some studies show it is no better than, or worse than the lecture in its effects on students' learning.

The review shows that very few research studies have investigated the effects of cooperative learning on students' learning in Vietnam.A strong relationship between cooperative learning methods and higher achievement as well as greater long-term achievement shown in the literature supports the following hypotheses:

Hypothesis 1: Students who are taught by learning together will have greater achievement in the psychologycourse than those taught through lecture-based teaching.

Hypothesis 2: Students who are taught by learning together will have greater retention of information taught in the psychologycourse than those taught through lecture-based teaching.

3. Research Method

3.1 Sample

This study used a "convenient sample" (Creswell, 2009) of 110primary education students from two intact classes in Faculty of Education at An Giang University. One class ($n_1 = 55$) acted as the experimental group, and another class ($n_2 = 55$) acted as the control group. In the treatment group of 55 students, there were 50 females and 5 males with a mean age of 18.27, while in the control group of 55, there were 50 females and 5 males with a mean age of 18.36. The two groups were pretested on the achievement test before the treatment. The results of a one-way ANOVA analysis showed there were no statistically significant differences on age ($F_{(1, 108)} = .652$, $p = .42$, ES = 0.006) and pre-test scores ($F_{(1, 108)} = .258$, $p = .613$, ES = .002) between the treatment group and the control group (Table 1). These results indicate that students in both the experimental group and control group had similar age and pretest scores in psychology subject before the experiment commenced.

Table 1. The results of ANOVA between groups

	Experimental group ($n_1 = 55$) Male = 5, Female = 50		**Control group** ($n_2 = 55$) Male = 5, Female = 50				
Variable	**Mean[a]**	**SD**	**Mean[b]**	**SD**	**Mean difference (c = a – b)**	**p**	**Significance (p <.05)**
Age	18.27	.52	18.36	.65	-.09	.42	p >.05
Pre-test scores	18.87*	4.58	19.79*	4.79	-.45	.61	p >.05

*Maximum score : 100.

3.2 Research design

The design used in this study was the pretest-posttest non-equivalent comparison-group design (Table 2). This design was selected because it may help test the cause and effect relationship between the independent variable and the dependent variables. Since the subjects were not randomly assigned to treatment or control groups, some threats (selection bias, selection-maturation, selection-instrumentation, selection-regression and selection-history) to the external and internal validity were possible (Creswell, 2009). Accordingly, these threats will be considered. As both the experimental and control groups took the same pretest (before the experiment) and posttest (after the experiment), and the experiment covered the same time period for all subjects, testing, instrumentation, maturation, and mortality are not internal-validity problems (Ary, Jacobs, & Razavieh, 2002). Also, the a psychology lecturer alone taught both the treatment and control group, therefore history is not a problem in this study, since differences among teachers cannot systematically influence posttest results although history may contribute slightly to retention test comparisons (Ary et al., 2002).

Table 2.Research design

Group	**Pretest**	**Treatment**	**Post-test**
Experimental group ($n_1 = 55$)	O1 - Psychology knowledge (Dependent variable)	X Learning together (Independent variable)	O3 - Achievement - Knowledge retention (Dependent variable)
Control group ($n_2 = 55$)	O2 - Psychology knowledge (Dependent variable)	- Lecture-based teaching (Independent variable)	O4 - Achievement - Knowledge retention (Dependent variable)

3.3 Instrument

An achievement test included 40 items focused on the students' knowledge of the psychology knowledge. This test covered all knowledge aspects of 8 psychology units (consiousness, feeling, perception, thinking, imagination, sentiment, will, and memory). All questions were present in a multiple-choice format. Each item had four alternative choices for the correct answer. It was used to assess students' psychology knowledge before the treatment, and measure students' achievement and their knowledge retention in psychology after the treatment. The maximum score for the knowledge component of the achievement test was 100. The content validity of this test was checked and revised by two psychology lecturers at An Giang University. The test was piloted with English students (n = 50) who had taken the psychology course the year before. Using Crobach's Alpha, the reliability of the test was .90. It was, therefore, accepted that the test had good reliability and discriminatory power.

3.4 Experimental procedure

Prior to the beginning of the academic year, two intact primary education classes at An Giang University in Vietnam were selected for the study before these classes were scheduled. One class was randomly chosen to receive lecture-based teaching technique and acted as the control group, and the other received learning together technique and acted as the treatment group in a psychology course for 8 weeks. A pretest on psychology knowledge was administered to both groups before the treatment. The psychology course comprised 8 units and each unit taught within 100 minutes in one week. The same psychology lecturer taught both group. In the control group, the lecturer instructed students to learn the psychology knowledge content as a result of lecture-based teaching in logical steps, and students worked as a whole class group. In the treatment group, the lecturer guided students to learn the psychology knowledge content using the learning together technique. In this group, the lecturer applied the following eight steps (1) the lecturer organized the learning materials and identified the objectives of the subject matter, (2) the lecturer introduced the structure of the lesson, and raised the outcomes expected, (3) the lecturer formed groups, (4) the lecturer moved students to groups assigned, (5) the lecturer delivered the learning materials to students, (6) students studied their learning materials, (7) students helped each other to learn their learning materials, (8) students presented their understanding of the entire unit, and (9) the lecturer assessed students' understanding through their presentation in front of the whole class. This whole process was repeated 8 times, once for each unit of work. Throughout the experiment both groups could not meet at the same time as they were taught by the same psychology lecturer. Therefore, the treatment group was conducted on Wednesdays, while the control group was on Fridays. Both groups covered the same psychology knowledge content and received psychology instruction for the same amount of time in the mornings, and in the same room. All students in both groups participated in one instructional session of 100 minutes per week for each unit over the 8 weeks. After the treatment, both groups took a posttest measuring students' achievement in the tenth week and a retention test measuring students' knowledge retention in the fourteenth week.

3.5 Data analysis

A one-way ANOVA analysis was performed to compare the means of the pretest scores between the groups before the treatment. An independent-samples t-test was used to compare the groups' posttest and retention test scores. All analyses were tested for significance at the .05 level.

4. Results and Discussion

4.1 Achievement

The results of the ANOVA analysis show no statistically significant difference in psychology pretest scores ($F_{(1, 108)} = .258$; $p = .613$) between the experimental group ($M = 18.86$, $SD = 4.58$) and the control group ($M = 19.31$, $SD = 4.79$). These results show that students in both groups had similar academic knowledge on the psychology before the experiment commenced. However, the findings obtained from t-test analysis on the psychology posttest scores showed a significant difference ($t_{(108)} = 9.60$, $p = .000$) between the experimental group ($M = 77.36$, $SD = 4.52$) and the control group ($M = 67.00$, $SD = 6.60$). The magnitude of the difference in the means (mean difference = 10.36) was very large ($ES = 0.46$). The results showed that the experimental group which had engaged in learning together produced a higher overall improvement in scores on the psychology posttest scores. This finding supports the first hypothesis which states that students who are taught by learning together will have greater achievement in the psychologycourse than those taught through lecture-based teaching. The results of this study are consistent with the findings of previous research (Yamarik, 2007; Kilic, 2008; Doymus, 2008a&b, Doymus et al., 2010; Sahin, 2010) which indicate that cooperative learning results in higher academic achievement.

4.2 Knowledge retention

Results of the t-test analysis on the psychology delay test scores showed a significant difference ($t_{(108)} = 10.71$, $p = .000$) between the experimental group ($M = 76.31$, $SD = 4.40$) and the control group ($M = 65.87$, $SD = 5.73$). The magnitude of the difference in the means (mean difference = 10.44) was very large (ES = 0.51).The results showed that the experimental group which had engaged in learning together produced a higher overall improvement in scores on the psychology delay test scores.

The result supports the second hypothesis that students who are taught by learning together will have greater retention of information taught in the psychologycourse than those taught through lecture-based teaching.In this study students in the cooperative learning group, which involved higher participation in the process of learning, had greater long-term achievement on the psychology delay test than students in the comparison group because they were equipped with skills in terms of teaching others and elaborating ideas on the concept taught in the learning process. This finding validates the results of some earlier studies (Johnson & Johnson, 2005; Tanel & Erol, 2008; Moore, 2008; Sahin, 2010) which indicate that cooperative learning promotes greater long-term achievement than individual learning at least 24 hours after the treatment.This study shows that learning activities based on divided learning tasks, along with the students' personal involvement in the learning process, contributed to their gains in achievement on the delay test in the treatment group. The results of this study are consistent with the findings of previous studies (Slavin, 2011; Sahin, 2010; Johnson & Johnson, 2008; Tanel & Erol, 2008; Webb, 2008; Moore, 2008) that indicate that cooperative learning results in greater long-term achievement than the traditional lecture-based teaching group.

5. Conclusion

Cooperative learning stimulated cognitive activities, promoted higher levels of achievement and knowledge retention. Although all students in the treatment group were accustomed to a teacher-centered style of instruction, they could adapt to this new cooperative style of learning in 8 weeks of instruction in an Asian learning context. It can be argued therefore that Vietnamese students are highly adaptive in accommodating to a Western style of learning. Consequently it appears that learning styles are not culturally-based but contextual. In this study, the effectiveness of cooperative learning on students is compatible with the requirements of teaching innovation in Vietnamese higher education (MOET, 2009). The findings provide Vietnamese teachers with more empirical support for promoting productive changes in teaching methods to improve student learning. Therefore, cooperative learning is highly recommended as an alternative instructional pedagogy in the current wave of educational reform in Vietnamese higher education. To promote the implementation of cooperative learning effectively, both lecturers and students would need to undergo a training course in this kind of learning. Although the present findings support the effectiveness of cooperative learning for students' achievement and their knowledge retention, the sample of this study is restricted to only 110 participants. Therefore, future studies should apply cooperative learning with more participants to generate more evidence on the effects of cooperative learning.

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