



Effects of Cooperative Learning vs. Traditional Instruction on Prospective Teachers' Learning Experience and Achievement

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ABSTRACT. The study investigated the effects of three experimental conditions on prospective teachers' learning experience and achievement in the course of Educational Psychology. The conditions comprised (a) Traditional Instruction (TI) (b) Cooperative Learning Loosely Structured (CLLS) and (c) Cooperative Learning Students Team Achievement Division (CL STAD) model. The study explored change in students' scores on learning experience and difference in achievement under these experimental conditions. Thirty-two student teachers enrolled in master degree program were the subjects of the study. Repeated measure design was used for the study. Thirty intervention lessons (ten in each condition) were delivered during the whole semester. Learning experience measure and Achievement test were administered at the end of each phase. The results of repeated measure analyses of variance (ANOVA) reveal that there is statistically significant difference between prospective teachers' scores on learning experience measure across three experimental conditions. ANOVA results also reveal that there is a statistically significant difference in achievement scores favoring both CL conditions. The study concludes that cooperative learning enhances perspective teachers' academic achievement as compared to traditional instruction and promotes enriched, enjoyable and interactive learning experience. The study has implications for teacher educators to prefer innovative instructional strategies as CL while teaching to prospective teachers.

Key Words: Cooperative learning; STAD model; traditional instruction; learning experience; prospective teachers

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INTRODUCTION

Teaching at higher education has almost been the same for centuries as university teachers seem to be more committed towards conducting research than improving their teaching by using innovative instructional strategies (Johnson & Johnson, 2002). The research suggests that the use of a single method cannot make one's teaching effective (Kromrey & Purdom, 1995) as it is generally observed that no method can work in a variety of situations, achieve all types of objectives and suits to all types of content areas. Biggs (2007) is of the view that wise and effective teaching does not simply involve applying general principles of teaching rather it should aim at engaging students in learning related activities that enable them to theorize, generate new ideas, reflect and solve problems in the target content area. Kromrey & Purdom (1995) state that different factors affect the selection of alternative methods such as teaching objectives, learners-teachers' characteristics and philosophical beliefs of the teacher. They further state that little guidance is available to teachers regarding the types of methods most effective for postsecondary education.

The last few decades have witnessed the emergence of new instructional strategies. Among them, few have attracted researchers, curriculum developers and teachers more than Cooperative Learning (CL) which according to (Slavin, 1996) is one of the most successfully explored instructional strategy in the history of educational research. Cohen (1994) suggests that CL strategies contribute to the promotion of higher order thinking, socially acceptable behavior, and interracial acceptance.

Abrami, Poulsen & Chambers (2004) define Cooperative Learning (CL) as "an instructional strategy in which students work actively and purposefully together in small groups to enhance both their own and their teammates learning" and its use is strongly advocated by some of the most prominent researchers in education (Antil, Jenkins, Wayne & Vadasy, 1998). Cohen (1994) states that in Cooperative Learning students work together in small groups in such a way that everyone can participate in a group task that has been clearly assigned. Two components of CL distinguish it from traditional group work: (a) positive interdependence i.e. the feelings that they cannot achieve their group goal without the joint efforts of team members (b) individual accountability i.e. each member of the group feels accountable for their performance (Slavin, 1990).

Jolliffe (2005) explored the implementation of CL (STAD model) in some selected schools in England and found that teachers in those schools were convinced of the effectiveness of CL regarding its positive effects on

(a) academic achievement (b) development of social skills. A large majority of the teachers from the sample schools reported its use and half of them claimed to use it in more than half of their lessons. Gomleksz, (2007) through an experimental study explored the effects of Jigsaw II method of CL on English as foreign language students and concluded that CL enhances students' learning of vocabulary and use of active and passive voice in English. It also revealed that CL develops students' positive attitude towards learning English. Stockdale & William (2004) examined the effects of CL learning teams on 378 undergraduate students enrolled in an educational psychology course and found that CL reduces disparity between high, average and low achieving students regarding achievement. However, high achievers benefit less from cooperative learning as compared to average and low performing students. He concluded that CL enhances the prospects for low achieving students of passing a course more as compared to TI.

So far, most research on cooperative learning has been mainly concerned with whether or not CL settings result in better learning outcomes as compared to competitive and individualistic settings. These studies might not have been convincing for teacher educators and university teachers as learning gains is not the sole rather one of the objectives of higher education. Efforts have been made to explore the effectiveness of cooperative learning in higher education especially in teacher education. A few studies, however, explored CL from different dimensions in teacher and higher education. Venman, Benthum, Bootsma, Dieren and Kemp (2002) examined the attitude of prospective teachers regarding CL and its potential effects on them and found that prospective teachers had an overall positive attitude towards cooperative learning and it had a significant effect on their pupils' engagement rates in classroom and suggested to use it in teacher education which will increase the likelihood of its use by them in future. Kromrey & Purdom (1995) are of the view that lecture and cooperative learning are used to achieve the objectives of knowledge and skill acquisition and application of this knowledge and skills. Sullivan (1996) states that CL strategies are used for promoting critical thinking via discussion, debate and group work. He further suggested that applying CL together with traditional lecture method facilitates the development of analytical skills. Despite great positive effects of CL, more research is needed to investigate the contribution of group work based on individual accountability and group rewards (Abrami & Chambers, 1996) and research is also needed to incorporate CL strategies into daily classroom lessons (Siegel, 2005).

Previous research is inconclusive on how pre-service teachers feel, behave and reflect when they experience cooperative learning and whether

such type of experience results in their better achievement as compared to traditional instruction at the higher education. Researchers are of the view that investigating CL at the university level specially in teacher education will not only inform the faculty its worth regarding its usability and applicability but also facilitate the prospective teachers to learn, understand and practice the innovation for using it in their future teaching. Therefore, the study was initiated in a teacher education institute of a public university in Pakistan. The institute runs more than thirteen programmes in the area of teacher education and it has one of the largest PhD faculty including foreign qualified staff. However, regarding classroom instructional practices, it is following decade old methodologies. Personal experiences of the researchers, informal interviews with faculty and students reveal that most widely used instructional strategy is traditional instruction or lecture method. On the other hand, Higher Education Commission (HEC) of Pakistan stresses the need to bring a significant change in instructional strategies to make higher education including teacher education more interactive and innovative for making it compatible with international standard. It has taken many initiatives for the development of faculty at higher education in this regard. However, despite initiatives of HEC, no significant effect was observed on classroom teaching learning process at the institution. Thus, a need was felt to explore and test innovative instructional strategies as CL in the above mentioned context and try to move from years old traditional instructional method to modernized and innovative instructional strategies. Cooperative learning is one such instructional strategy which shows potential to be used in higher education. Thus, the present study investigated the effects of traditional instruction vs. two conditions of CL (a) CLLS and (b) CL STAD model on pre-service teachers' learning experience and learning achievement. The study addressed the following research questions: (i) Is there any change in prospective teachers' learning experience under three different learning conditions i.e. traditional instruction, CL loosely structured and STAD model of CL? (ii) Is there a difference between students' achievement scores under these conditions?

METHODOLOGY

This section of the paper describes the context of the study, design and description of instruments.

Context of the Study

The study was conducted on 32 prospective teachers (23 female and nine male) enrolled in the first semester (autumn) of Master of Arts in Education programme (session 2007-09) in a public university. Cooperative

learning was introduced during a course on Educational Psychology and Guidance offered to M.A. Education students. The intervention was spread over 30 class sessions over a period of one semester (4 months). The frequency of the lesson was twice a week with each lesson of 90 minutes. No special alteration was made in the regular content, timing and format of the course work except that CL was introduced after traditional instruction in the middle 10 and last 10 lessons.

Design of the Study

Repeated Measures Design was used for the study. The design involved three phases and all subjects passed through these phases and filled in the learning experience measure thrice (once after each phase) and also took three achievement tests (one after each phase) relevant to content area covered at each phase.

Experimental Conditions

The intervention consisted of 30 lessons delivered in three phases. First of all, the teacher (researcher) divided the course content into three parts to be covered in each phase. All three conditions had teacher's presentation. In the first condition, it had approximately 90% of the whole class time. The teacher used to provide handouts to students before the class.

First Phase: Traditional Instruction

First 10 lessons were delivered through traditional instruction. It involved teacher's detailed presentation followed by students' questions (three to five on an average) at the end of each class session. The term traditional instruction is loosely used in literature and usually represents other than the experimental condition what so ever it might be. In our context, it involved teachers' detailed lecture or presentation and students' questions during or after the session. On the whole, the students remained passive in the class. After the completion of 10 lessons, the teacher administered achievement test-1 containing 25 marks. The Learning Experience Measure 1 (LEM1) was also administered at the end of this phase. Prospective teachers were asked to fill in the measure by recalling to their mind their learning experience during first ten lessons (traditional instruction) and rate the statements on 5- point scale.

Second Phase: Cooperative Learning Loosely Structured

The second condition (CLLS) was meant to enable the prospective teachers to have a smooth transition from traditional instruction to formal cooperative learning. Thus, it did not have all five elements of cooperative

learning rather it involved only two of them i.e. verbal interaction and individual accountability. In this phase, the teacher assigned students to eight heterogeneous groups on the basis of their performance in the first achievement test with each group containing three to five members who were high, average or low achievers. However, the groups were of the same gender: two male and six female due to socio- religious constraints. Prior to this phase, the students were briefed about CL, its components and different models. Some of the students showed hesitation to be taught through CL. It had short teacher's presentations, followed by students' group work. Individual accountability was ensured by administering verbal or written individual quizzes. However, these quiz scores were not considered for team recognition or certificate distribution. The reason was that the students took the quizzes sitting in their groups not in formal testing conditions.

In this phase, each lesson started with the teacher's presentation (30 to 35 minutes only) followed by student's group work. During the group work, the teacher worked as facilitator and ensured that group members were involved in verbal interaction during group work. The students were expected to learn the presented material through discussions i.e. asking questions, answering questions, summarizing and drawing conclusions. In the beginning, the students did not exhibit required verbal interaction and the researcher moved to each group and explained not to read their handouts silently, rather tried to promote the reciprocal interaction.

The students were orally quizzed during the first five lessons by randomly selecting one member from each group turn by turn to answer the question. In the next five lessons, they were individually quizzed. Each quiz consisted of four to five MCQs and one to two short answer. The teacher used to inform about the individual scores on the next day following each quiz. However, there was no group reward. At the completion of second phase, the students were administered achievement test II based on the content/ topics covered in next 10 lessons (i.e. 11 to 20). The students were also administered Learning Experience Measure 2 (LEM2). They were asked to fill in the questionnaire keeping in mind the 10 lessons they attended during second phase.

Third Phase: Cooperative Learning STAD Model

In the third phase, the teacher used modified version of STAD model. The modification was that instead of considering their improvement scores in comparison to their base scores, their individual scores obtained in every quiz were considered both for their team scores and for final evaluation (not following the mechanism suggested by Venn, 2000). These scores were

worth 10 marks (10%) on the pattern used by (Clinton & Kohlmeier III, 2005) for the final course evaluation. This phase employed four out of five components of the STAD model i.e. (a) teacher's presentation (b) students' group work (c) individual quizzes (d) team recognition and rewards (Gaith, 2003).

During this phase, first lesson started with the teacher's presentation that was followed by group work (groups remained unchanged in the third phase). After the group work, students took individual quizzes sitting in formal testing conditions. In the next class, students were informed with both their individual scores and team scores (sum of the individual scores of each group member). First three teams were recognized as Super team, Great team and Good team. All members of the winning teams were invited to receive their certificates (teacher made). Each certificate contained a team score and individual scores of team members. Thus, the cycle of each CL (STAD) lesson was completed. The winners discussed how they won and losers thought about their defeat. Thus, through reward structure, a sense of individual accountability and positive interdependence was developed.

After the third phase, the students were administered achievement test based on the last ten lessons. They were also administered Learning Experience Measure 3 (LEM3). As they had completed both the instruments, they were asked to reflect on their learning experience regarding CL through reflection journal in this course.

Development of Instruments

The following instruments were used in the study:

Learning experience measure

In order to collect data regarding prospective teachers' learning experience, the researchers developed learning experience questionnaire. It was meant to explore their learning experience under three conditions. It contained 37 statements on 5-point scale. The instrument was constructed after reviewing relevant research articles in the field (Gaith, 2001, 2003, 2004; Hanze & Berger, 2007). High scores in the instrument indicated feelings of enjoyable and active participation in the classroom learning activities and prospects of future use of the methodology by them whereas low score indicated low participation and passiveness on the part of the prospective teachers. The same instrument was used for each phase and named LEM1, LEM2, LEM3 respectively. The reliability (Cronbach alpha) of the instrument was 0.78, 0.84 and 0.79 at each phase respectively and mean was 0.80.

Achievement Tests

Three achievement tests each based on content covered in each phase having same format and scoring distribution (ten MCQs, five short answer questions and one restricted response item) were developed by the researcher. Each test contained questions worth 25 marks.

RESULTS

The data were analyzed by applying one way repeated measures analysis of variance (ANOVA) separately for both learning experience and achievement. The results regarding first research question “is there any change in prospective teachers’ learning experience under three different learning conditions i.e. traditional instruction, CL loosely structured and STAD model of CL?” revealed that there was a statistically significant difference between prospective teachers’ learning experience scores across three conditions (Wilks Lambda=.32, $F(2, 28) = 29.26$ $p < 0.01$ multivariate partial eta squared=.68). As the mean difference on learning experience was significant at $p < 0.01$, pair-wise comparisons were run to find out comparative effect of different conditions on learning experience of students as shown in table 1.

Table 1. *Comparison of Prospective Teachers’ Learning Experience Scores Across Three Conditions*

Condition	N	\bar{X}	SD
Traditional instruction	30 ⁱ	129.77	15.07
Cooperative learning loosely structured	30	150.03	09.78
Cooperative learning STAD model	30	146.16	09.40

Pair-wise (Post-hoc tests) comparison revealed that there was a statistically significant difference between prospective teachers’ scores on LEM1 ($\bar{X} = 129.77$) and on LEM2 ($\bar{X} = 150.03$) at $p < 0.01$ favoring the second condition. Thus, the prospective teachers valued their learning experience in CLLS more as compared to TI. The table further revealed that there is also significant difference between their scores on LEM1 ($\bar{X} = 129.77$) and on LEM3 ($\bar{X} = 146.16$) at $p < 0.01$ favoring the third condition which shows that prospective teachers also appreciated the structured learning environment offered under CL STAD model more than the traditional instruction. The value of partial eta squared 0.68 suggested a large effect size.

ⁱ Two students did not fill in all measures, hence they were excluded from the analysis and sample consisted of 30 valid cases

The second research question “is there a difference between students’ achievement scores under these conditions?” sought to find out the difference between the prospective teachers’ scores on three achievement tests i.e. achievement test 1, achievement test 2 and achievement test 3 administered under three experimental conditions respectively. The study also found statistically significant difference between prospective teachers’ scores in the achievement tests across all three conditions. (Wilks Lambda = 0.50 $F(2, 28) = 13.85$ $p < 0.01$ multivariate partial eta squared = 0.50). The results also showed a large effect size.

Table 2. *Comparison of Prospective Teachers’ Achievement Scores Across Three Conditions*

Condition	N	\bar{X}	SD
Traditional instruction	30	17.73	3.07
Cooperative learning loosely structured	30	20.17	2.71
Cooperative learning STAD model	30	20.20	1.69

Pair-wise comparisons in table 2 revealed that there was a statistically significant difference between prospective teachers’ achievement scores in favor of CLLS ($\bar{X} = 20.17$) as compared to TI ($\bar{X} = 17.73$). The table further revealed that there was also statistically significant difference in favor of CL STAD model ($\bar{X} = 20.20$) as compared to TI ($\bar{X} = 17.73$). The study suggested that CL results in higher learning gains as compared to traditional instruction. The reason for higher learning gains in CL might be that as compared to traditional instruction, prospective teachers had more opportunities to participate in the lesson, also had the opportunity to learn from group members. Quizzes provided them the motive to learn during the same class and award of certificates motivated them (Vedder & Veendrick, 2003) to learn in an enjoyable way. Thus, low achievers also had the chance to come to the stage as team member to receive certificates which is not usually possible in traditional classroom settings and such recognition makes them contribute in group learning (Lyman & Foyle, 1991). This motivates students to work hard and win again.

In addition to the empirical evidence in favour of CL (STAD and informal), prospective teachers’ reflections about learning experience were also gathered through an open ended reflection journal at the end of the semester. A synthesis of the reflection showed that they valued the things that CL promotes: care for others, feelings of pleasure/enjoyment, development of mutual understanding. On the other hand, they also had some concerns: boundness to teach even those whom they do not like. The responses emerged around the following clusters.

- (a) CL as an enjoyable learning experience
- (b) Wished to be taught again through CL
- (c) Plan to use this methodology in future
- (d) CL as first experience in life
- (e) CL as effective methodology
- (f) Feelings of cooperation and care for others

Some of the responses of the perspective teachers are presented below: One student responded, "It is matchless methodology", another responded, "nobody taught us like that before" one reported "I am going to use CL in future". Another response came "CL provides opportunities to understand and develop feelings for others". One student wrote, "Group leader was in pressure, he was bound to teach even those members whom he did not like". These themes are consistent with (Morgan, 2003) study in which he explored the reflection of students regarding group exam and grades.

DISCUSSION

Based on the findings and themes emerged from the reflection of prospective teachers, we can conclude that CL is both enjoyable and effective teaching strategy and it results in significantly higher learning gains and positive learning experience as compared to TI. It provides the students opportunity to interact with their classmates and such interaction develops in them feelings of cooperation and care for others. However, it is also astonishing that it was the first CL exposure of most of the perspective teachers, which reveals that such innovative methods have yet to make their grounds/ roots at both school and college level in Pakistan. Thus, if we want to see CL practiced at both school and college level, we should introduce it in teacher education and such type of experience develops in them the willingness to use the innovation in future. The study reveals the significance of transitional phase in bringing a major change in the existing repertoire of teachers. If instruction is to be made student centered from teacher centered, this shifting should be smooth and gradual by introducing interim/ transitional phase and hence enabling both the teacher and students to get mentally prepared to adapt to the requirements of the new learning phenomena.

However, students reported more enjoyable and active learning experience in CL (loosely structured) as compared to STAD and TI which needs further probing. The alternative explanation for prospective teachers' highest mean score on learning experience measure in the second condition

is that it was a clear shift from teacher centered to student centered methodology and thus the score was inflated a bit higher. They enjoyed working in groups without taking the responsibility of ensuring the learning of other group members. Moreover, classes in the second phase were also held as per schedule. Thus, the prospective teachers did not feel any anxiety while shifting toward the CL STAD model and that was the purpose of this transitional phase.

Furthermore, the third condition was demanding and more structured than the second condition. Prospective teachers took individual quizzes, taught other group members and contested for the certificates. These things made them positively interdependent and individually accountable in the true sense. Moreover, they filled in the LEM3 just after taking the final term examination when they were also scheduled for their final paper for an other course next day. It is also worth mentioning that in the second last week of the semester, the prospective teachers also attended two make up classes due to running behind schedule. These factors might have contributed in lowering the scores on the measure in the third condition as compared to the second condition.

The study has provided an empirical evidence of using instructional innovation along with traditional instruction in higher education. This may be motivating for those university teachers who want to use CL or other such innovations in higher education but they do not dare to do so due to the issue of content coverage. The study also reveals that we need not to get rid of old methods radically rather focus should be on their wise use and taking suitable time to gradually replace it by innovations.

The study also has implications for university and teacher education faculty that they may initiate to implement innovative instructional strategies side by side with TI without altogether replacing it. As content coverage is usually presented a strong argument by the practitioners of TI, it is argued that the model used in this study (STAD) does not result in less content coverage.

Though the present study has provided empirical support for university and teacher education faculty to make decision regarding the use of CL, the study does not suggest whether it will be beneficial for those faculty members who have not yet tried any innovation in their career. Further action research is needed to explore what are the causes for not using innovative instructional strategies in higher education. Research is needed to explore/ determine how much time/ duration is needed for average faculty member for shifting from traditional instruction to formal cooperative

learning. Research is also needed to explore which of the CL models are compatible with traditional instruction to handle the issue of content coverage which is considered one of the important issue/ strong argument by the supporters of traditional instruction.

The study provides insight for teachers who want to implement CL in their regular classroom lessons. In the beginning, they may start informal or less structured model and take time to understand the procedure and rationale behind CL. Veeman et al. (2002) are of the view that even the experienced teachers hesitate to use CL due to the following problems; (a) fear of losing control of the class, (b) teachers' lack of self-confidence, (c) time constraints for content coverage, (d) feeling difficulty in doing alternative assessment, (f) fear of unequal participation by students. The study suggests to use the transitional phase to address all the above mentioned problems. However, the study involved small sample of just 32 prospective teachers (30 valid cases), which does not permit generalization. Further research is needed on large samples preferably independent samples to find out more valid results or to have deeper insight regarding the use and effectiveness of CL in Pakistan and in other countries. The researcher used CL STAD model, it is suggested that more research studies should be conducted to test the usability and effectiveness of other CL models.

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