



Nurturing Cooperative Learning Pedagogies in Higher Education Classrooms: Evidence of Instructional Reform and Potential Challenges

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This article reports on a case study that examined the nature and extent of students' participation in a cooperative learning (CL) intervention, and its effects on students' learning, satisfaction and gains. The participants included 58 undergraduate students and 2 teachers. The quantitative results showed that 4 inter-correlated pedagogical factors: Cooperative interaction, task orientation, academic challenge, and teaching effectiveness, together accounted for 69% and 52% of the variance in students' learning satisfaction and gains scores, respectively. Each factor significantly predicted students' learning satisfaction and gains, $\beta \geq .27$. Also, the qualitative results demonstrated that the teachers were able to incorporate CL pedagogies to existing instructional practices. Correspondingly, students found that they were more focused on their learning, experienced more interaction and enjoyment, and gained more academically than they had achieved before being involved in this initiative. However, the academic culture and local constraints were negative influences on implementation; findings provide an initial evidence-base that demonstrate how shifting the focus of classroom instruction from a content-centred form to a learning-centred form impacts not only the quality of teaching in class but also the quality of learning and other important indicators of students' success.

Keywords: Cooperative learning; Ethiopia; higher education; pedagogical factor

Quality teaching and learning has taken center stage in the on-going educational reforms in higher education as promoting learning has become a major issue of concern to the 21st century university (Schleicher, 2011). Creating instructional conditions that promote quality learning are challenging for many higher education teachers (Haggis, 2006) since they commonly rely on the lecture as their main form of teaching (Fink, 2013). The situation is compounded in the developing countries, particularly Africa because of rapid expansion of higher education, difficulties with accessing resources, and the constraints associated with internal capabilities (Schweisfurth, 2011; Teferra & Altbach, 2003).

If teachers are not supported to change their instructional practices, it is more likely that many of the challenges they face will remain too great to overcome (Ramsden, 2003). To cope with these constraints and promote teaching quality, the primary focus needs to be on understanding the complexity of teaching and learning (Loughran, 2013), and transforming teachers attitudes and beliefs that change work habits (Goos, Dole, & Makar, 2007). A more realistic strategy may be the establishment of new pedagogies that are adaptive to local needs and constraints while at the same time providing the necessary support for teachers during implementation (Penuel, Fishman, Yamaguchi, & Gallagher, 2007).

Various pedagogic approaches exist to promote quality teaching so that teachers can transform classrooms into more engaging and more supportive learning environments, and one such approach is structured small-group learning. Structured small-group instruction, here referred to as cooperative learning (CL) pedagogy, provides teachers with an alternative toolkit, to help them effect such changes (Smith, 2006; Yamarik, 2007). An extensive body of research provides evidence on the effectiveness of CL to improve the quality of teaching and learning in higher education (Smith, Sheppard, Johnson, & Johnson, 2005; Springer, Stanne, & Donovan, 1999). Research at the undergraduate level indicates that CL is more effective than traditional forms of teaching in terms of promoting quality learning demonstrated in students' greater academic achievement, more positive attitudes towards learning, and increased social outcomes (Johnson & Johnson, 2002b; Johnson, Johnson, & Smith, 1998, 2007). In this study, the term CL refers to an approach to small-group work that maximizes the quality of learning that results from quality teaching (Gillies, 2007).

Rationale

Attempts to promote quality teaching by imposing expectations on academics are likely to result in a compliance culture (Au, 2011) which, in turn, could impact negatively on them as they felt that they had lost ownership and control over their academic work, compounding their negative feelings about the changes they were expected to embrace (Shulman & Shulman, 2004). Part of the concern is that, quality teaching represents human behavior and can only be changed at an individual level when the individual wants to change (Biggs, 2012). From a developmental perspective, a focus on quality teaching through establishing a conducive and supportive culture is evolutionary (Squire, MaKinster, Barnett, Luehmann, & Barab, 2003) and cannot be dictated from above (Ramsden, 2003), but rather it needs to evolve from within the institution (Gosling, 2006).

Even if most institutions of higher learning and quality assurance agencies have not ignored the quality of teaching and learning occurring in classrooms, the concern remains that they have not seen it as crucial in their efforts to promote quality learning (Trowler, Fanghanel, & Wareham, 2005). This, in part, may be because the students' learning experiences and classroom culture are not considered critical for quality learning. Research has shown that the lecture is still the dominant pedagogy in higher education classrooms (Chisholm & Leyendecker, 2008; Kezar & Kinzie, 2006) which does not help quality learning as "the lecture rarely, if ever, supports learner engagement in inquiry, discussion, and/or expository learning" (Hennessy & Evans, 2006, p. 99), key elements in successful learning. Even good lecturing has been found to be inadequate to develop quality learning expressed in terms of students ability to apply information that has been mastered in new situations and

promote higher-order cognitive skills among students (Fink, 2013). These and other studies results suggest that lecturing alone is not working very well.

Most of the time, efforts to promote quality teaching result in the adoption of instructional techniques without full understanding of the prevailing conditions and the pedagogical reasons for the use of such techniques (Tabulawa, 2003). However, this stance appears misguided in the light of accumulated evidence over the years that reflect teachers' professional learning as a complex process rather than a linear one (Gravani, 2007; Webster-Wright, 2009).

In the Ethiopian higher education system, most teaching is characterized by a high degree of teacher control, student passivity and powerlessness (Desta, 2004; Fisher & Swindells, 1998; Tadesse, Manathunga, & Gillies, 2012; Zerihun, Beishuizen, & Van Os, 2012). The other issue is that, teachers continue to use instructional practices that are not effective at promoting quality learning. The reason for these shortcomings appears to be with the policy as it sets unrealistic expectation to promote the learner-centered approach in the system, without a corresponding focus on how to cope with the challenges of widespread implementation (Assefa, 2008), and without transforming the academic culture which appears to be quite resistant to change.

However, there are top-down initiatives but these alone were often found to be insufficient to achieve deep and lasting quality in university teaching and learning (Areaya, 2010). Additionally, research shows that the in-service teacher professional development program that has been implemented has not brought about the anticipated changes in pedagogical approaches in ways assumed by the program planners (Moges, 2010; Piper, 2009). Compounded by these and other problems, the quality of higher education in Ethiopia is continually deteriorating (Tadesse et al., 2012).

In response to the status quo in Ethiopia, a preliminary study was conducted to examine whether the process and contents of CL intervention constitute a substantial means by which Ethiopian higher education institutions can improve the quality of their teaching and learning. The primary purpose of the current study was to investigate the pedagogical factors that facilitated the quality of students' learning, and further assess the local constraints that surrounded the implementation process.

Operational Definition

In this study, quality teaching is defined as an aggregation of the effective teaching components of good teaching, appropriate interaction with the students, and fair and constructive assessment and feedbacks. Quality learning is defined in two ways: as an active process that builds upon significant learning experiences of the students and as an attainment of learning outcomes demonstrated in terms of increased knowledge and skills and satisfaction.

Conceptual Framework

This study conceptualizes CL pedagogy, in a very general sense, referring to the design and implementation of courses according to a CL approach (Smith, 2006; Smith, et al., 2005). Guided by this, the study applied curriculum-based innovative course design, and adapted implementation using a process as a way to structure learning (Hunter & Scheirer, 1988). Under these influences, the notion of experience being central in learning is emphasized, and the role of the process as a way to integrate curricular components is clearly demonstrated (Cornbleth, 1988). The philosophical roots of the argument for the CL pedagogy emanates from the epistemological and pedagogical stances as described in the works of scholars, particularly learning as doing (Dewey, 1963), learning as social participation (Lave & Wenger, 1991), learning as environmentally and culturally situated activity (Vygotsky, 1978), and learning as participation with other learners (Rogoff, Turkanis, & Bartlett, 2001). Thus, CL is considered as a pedagogy that promotes the quality of teaching and learning.

Cooperative Learning as a Pedagogy of Quality Teaching and Learning

Two critical features, are often cited in the literature to distinguish CL from other forms of small group instruction: positive interdependence and individual accountability (Johnson & Johnson, 2009). A sense of individual accountability forms the basis for a significant interaction among students. The notion of interdependence is established through structuring the learning environment for all members of a CL team. This helps the group members to share mutual responsibilities for learning and develop more positive relationships (Johnson et al., 2007). One strategy to effect this sense of mutual responsibility is through providing learning materials that must be shared among group members. A second way is assigning different materials to each expert team to master as in the Jigsaw strategy (Aronson, Blaney, Stephan, Sikes, & Snapp, 1978). Once the materials have been studied by each expert team, the members return to their original (home) groups to share learning with their teammates. Finally, group cohesion can be promoted through assigning a team, a joint goal with the group being collectively rewarded for their team performances.

Cooperative learning has been shown to be effective in improving the quality of learning (Sharan, 2010a). While less able students appear to benefit significantly from their engagement in cooperative groups (Wilkinson & Fung, 2002), high achievers do not appear to be disadvantaged and actually benefit from the opportunity of teaching peers (Webb, 2008). Benefits can, under certain conditions, accrue to both those giving and receiving help (Gillies, 2003). In heterogeneous peer-led groups, students of lower and higher ability can benefit mainly due to an informal teacher–learner relationship

formed between the group members (Cohen, Lotan, Scarloss, & Arellano, 1999). In addition, a multiplicity of other benefits including promoting friendships amongst students, improving self-esteem, and so forth have been highlighted (Cohen, 1994).

CL not only promotes student learning but it also, helps teachers to improve their teaching. As a tool to help transform teaching, CL is very attractive, as it has a firm research base, while on the other hand, it does not require expensive curricular resources (Johnson & Johnson, 2009; Sharan, 2010a). However, achieving positive results depends on the context in which it is implemented, providing staff development for the teachers involved (Ferguson-Patrick, 2011), explicitly describing the roles of the teacher, carefully designing the learning tasks, and ensuring students learn appropriate social skills (Gillies, 2004). Above all, it depends on understanding, commitment, and continual practice on the part of teachers who implement CL (Smith, 2000).

Method

Research Design

This study used a case study method (Stake, 1983), particularly an evaluative case study (Stenhouse, 1988), emphasizing directly the design and implementation of CL pedagogies. Both quantitative and qualitative data (Guba & Lincoln, 1983; Scriven, 1983) were used to gain a holistic picture of the implementation process and the results outcomes. The qualitative data included an exploratory case study of a CL intervention. This aspect of the study has the objective of identifying strengths and weaknesses associated with the CL intervention. Similarly, the quantitative data comprised an explanatory factor analysis dealing with variables representing aspects of the CL implementation. This explanatory analysis was intended as a preliminary study for pointing to important variables for further investigation; and testing a tentative pattern of relationship between important variables identified from the literature.

This evaluative case study does bring into focus fundamental questions relating to the process and outcomes of the CL intervention as used in the Ethiopian university classroom setting. Thus, the study did not include a comparison group and random assignment. A quantitative study model and a qualitative analysis framework were developed as theoretical frameworks that informed the analysis and interpretation of study results in subsequent sections.

Participants

Instructors for two undergraduate courses in two different disciplines were purposefully selected to participate in this pilot study. The courses included: 1) Psychology: Psychological Testing and 2) Sport sciences: Measurement and Evaluation in Human Performance. In these two courses, a total of 65 students (30 students of 2nd year, sport sciences major and 35 students of 3rd

year, psychology major) participated (Mean age 21.26 years, *SD* + 1.72 years; 83% were male). The student sample included 58 students (26 Sport Science major and 32 Psychology major). However, the researcher excluded 7 of the respondents from the analysis due to excessive information loss. Regardless of this, the researchers handled the random missing values across the different scales using list-wise deletion. Two teachers and eight purposively selected students participated in the interview. The student interviewees included four students from each discipline with a representation of students by gender and CGPA (high & low).

In this study, the teacher participants received one-on-one training on how to use CL methods in their classrooms based on a brief discussion about the nature and purpose of the study. Furthermore, different scaffolding techniques were employed in the process of cooperatively developing the CL lessons with the teachers, including (a) providing information and simplifying the task, (b) providing on-the spot feedback, (c) providing clues, options, and explanations, and (d) using probing questions to further elicit concepts and ideas. In addition, the first author tried to work collegially with the participant teachers on the design and implementation, assisted in guiding the teachers' practices, and closely supervised and monitored activities in the implementation process. Thus the entire design and implementation of the CL lessons was a cooperative endeavor.

The Nature and Contents of the Interventions

The main focus of this intervention is the incorporation of CL pedagogies into to existing instructional practices of two major courses in the department of psychology and the department of sport sciences. In these two courses, informal CL methods such as "think-pair-share" and "formulate-share-listen-create" were implemented, and the formal CL, the Jigsaw strategy (Aronson et al., 1978) and group investigation (Cohen, 1994) were employed. The students participated in the CL activities each week for four weeks during the first semester of 2011/12 academic year.

In one of the CL lessons, students of psychology identified the different scales in psychological testing and measurement; and defined different scales such as percentage, percentile rank, and z score as an introductory think-pair-share activities. Similarly, these students change draw scores into percentile ranks; and further changed raw scores to different linear scales as culminating activities in the end of the CL lesson. In the jigsaw lesson, psychology students dealt with "the reliability or consistency of test scores". The students discussed and deliberated among themselves on issues of test score theory; methods of test score reliability estimation; main factors influencing reliability of a test; and basic considerations in estimating the reliability of test scores. In the final lesson, the psychology students

engaged in group investigation to estimate reliability scores using different methods.

In one of the CL lessons, the sport science students engaged in listing out different flexibility exercises as an introduction to measuring flexibility and agility through a think-pair-share activity. As a culminating activity, these students did engage in and formulate-share-listen-create activities to identify different types of flexibility exercises and list them under "relative flexibility" and "absolute flexibility" using a table presented by the class teacher. In the jigsaw lesson, these students did engage in discussing the nature and use of different skill related to fitness measures. In the last lesson, these students engaged in a group investigation to determine and give reasons for using different instruments to measure skill related fitness.

The informal CL activities were designed to stimulate interest at the beginning of a lesson, and in a culminating activity to enable students to discuss the materials learned and thus acquire deeper understandings of it. These activities follow a three stage procedure, beginning with an individual learning activity, for example, defining the term then pair work, and finally teacher-led whole class discussion. With the individual work, every student takes responsibility to do the assigned learning task and write down something possible in preparation for the pair-work. With the pair-work, students share understandings and co-construct knowledge to arrive at a mutually shared learning product. While the individual work promotes personal accountability for learning, the pair-work promotes mutual interdependence through a commonly shared action of pair members. Finally, the whole class discussion is used for the sharing of group understandings more widely and this promotes social interdependence through the participation of students in the instruction.

The jigsaw lesson was designed and implemented for a double period as the activities needed more time to complete. For this, a single chapter of each course was considered, in the Psychology major, the chapter "Reliability Estimation" and in the Sports Sciences major, the chapter "Skill-Related Physical Fitness Measures". Students received hand-outs from these chapters in the previous week so that everyone had an opportunity to read the material in advance. This task helped students to exercise mutual autonomy, creativity, and collective decision making. Subsequently, in each jigsaw group, members had the opportunity to share the synthesized material from each expert's short presentation, ask questions and seek clarifications, and identify difficulties for further discussion with the teacher. This allowed jigsaw members to draw connections across the different topics of the chosen chapters while at the same time exercising individual accountability and social interdependence within the jigsaw group. In this lesson, students' were randomly assigned to the different jigsaw

groups and to the topics of expert groups. Heterogeneous membership was maintained by ensuring that students of mixed achievements and gender were included in each group with the main focus on promoting fairness and equity through establishing randomized heterogeneous groups.

To achieve practical implementation of the concepts covered in the jigsaw lessons, the last CL lesson was designed for students' participation in a group investigation and group marking using scoring rubrics. In this way, students experienced the full implications of positive interdependence within CL while at the same time they were provided with the opportunity to practice "assessment for learning". For this final lesson, the jigsaw group structure was maintained. Each jigsaw group worked on two-clustered assignment questions out of the possible seven-to-eight questions, and these assignments were randomly allocated to the different jigsaw groups. Through random assignment of questions and by including heterogeneous group members in each jigsaw activity, fairness and equity issues were addressed. The students completed the group investigation assignment out-of-class.

At the start of the last CL lesson, the teacher distributed a scoring rubric to the different jigsaw groups to refine their assignment work and prepare them for the intergroup peer assessment and marking. The main task of intergroup peer assessment was to assess the work of the other jigsaw members, based on a scoring rubric, and provide some written feedback to them. The teacher assisted in the different jigsaw groups by clarifying the contents of the scoring rubric and what they were required to do with it. Following the students' experience of finalizing the assignments and scoring in small groups under the close supervision of the teacher and the first author, they received their group marks; the lessons were then reviewed to gain an understanding of their impressions of their experiences of the group assignment and marking.

Structuring and Organizing Groups

The group structure is the building block of a CL pedagogy that determines the classroom norms (Gillies, 2003). In this study, group structure was formed using standard small group norms, for example, group size between two to four members and heterogeneity of members in each group (Cohen et al., 1999; Gillies, 2004). This study also used context specific criteria for selecting group members (Sharan, 2010b), for example, gender, cumulative grade point average (CGPA), and teachers' professional judgment.

The teacher's professional judgment refers to the determination of the composition of the small group based on the students' knowledge and skill, their personality characteristics, and their levels of interactivity in the class. In this way, the researchers ensured that the group formation has both theoretical justifications as well as

practical desirability. These are important characteristics of group organization that are considered here to be both theoretically and practically desirable. After structuring the groups, different small group tasks were organized. Group organization focuses on specifying small group learning tasks, assigning responsibilities, and managing students small group work (Cohen et al., 1999; Sharan, 2010a).

Data Collection

Questionnaire. Student participants of this study completed a survey questionnaire largely modified from the Australasian Survey of Student Engagement (Coates, 2010) and an earlier built local teaching effectiveness instrument (Tadesse, 2006). This earlier instrument was prepared by the first author for the purpose of measure teaching effectiveness. Through the different items, participants were asked to think about their experiences in the CL activities, and perceptions regarding learning satisfaction and educational gains. While reading statements, participants indicated how true the statements were for them. Teaching effectiveness items began with, 'Based on your experience in the cooperative learning activities of this course, please rate the quality of teaching on the following points?' and were scaled 1 (poor) to 4 (very good). Levels of academic challenge items began with, 'During the cooperative learning lesson to what extent your coursework emphasized the following intellectual activities?' and were scaled 1 (very little) to 4 (very much). Cooperative interaction and task orientation items began with, 'During the cooperative learning lesson, about how often have you done each of the following?' and were scaled 1 (never) to 4 (very often). Satisfaction items began with, 'How would you evaluate the level of satisfaction you and your class students obtained from the learning you experienced in this course?' and was scaled 1 (very little) to 4 (very much). The remaining educational gain items began with 'To what extent has the learning experience in the cooperative learning lesson contributed to your learning and development in the following ways?' and were scaled 1 (very little) to 4 (very much).

Semi-structured interview. The teacher and student participants were interviewed separately using the first author's semi-structured interview protocol. We conducted one-on-one interviews with teachers and students as one source of data collection. Interviews ranged between 20 to 30 minutes and focused on a series of questions that asks the participants for their views on the following themes: (1) general perception about their experience in the CL lessons; (2) aspects of CL they have seen as strength; (3) examples that reflect this strength; (4) the teacher's roles and the students' responses in the CL lessons; (5) some of the challenges they have faced; and (6) their general comments about the CL lessons in general.

Specifications of the Quantitative Study Model

In the realm of evaluation of instruction, the probable nature of the relationships among instructional conditions ascribed to facilitate students learning and development can best be determined by taking a core set of variables based on insights gained from the literature and empirical evidence (Cronbach, 1983). The most salient features of this relationship can be defined through pathways among the variables to indicate which predictor variables influence the outcomes (Bollen, 2002). Adding other variables to the model tests the stability of the model (Ahlfeldt, Mehta, & Sellnow, 2005) and expands its dynamic responses and counterfactual effects (Bentler, 2007). The theoretical underpinnings of these interactions, particularly embedded in the higher education research literature provide a rather simple framework for testing the predictive relationships of the pedagogical factors with the student outcomes (Carini, Klein, & Kuh, 2006; Steele & Fullagar, 2009).

Seen from a CL perspective, researchers such as Gillies (2007), Johnson, Johnson, and Smith (2007), and Sharan (2010a) intended a causal link when they made a distinction between the CL condition and academic and social outcomes. In this scenario, the condition indicates the pedagogic tools and instructional practices that facilitates (Smith et al., 2005; Webb, 2008) while the outcome represents students’ personal reactions as a result of exposure to the proposed instructional condition (Sharan, 2010a). This implies the separation of the instructional process and outcome (Yamarik, 2007). This makes it quite clear that students deal with the CL condition in some way before any positive responses to it occur in terms of outcomes (Yamarik, 2007). There is empirical evidence about the practical benefits of a CL model for the university classroom instructions (Johnson & Johnson, 2002a; Johnson et al., 2007; Smith et al., 2005; Thanh, Gillies, & Renshaw, 2011; Yi & LuXi, 2012). Therefore, this study’s quantitative model draws from the broader literature on student engagement theory related to the learning experience of undergraduate students (Coates, 2006; Kuh, 2009) and the CL theory related to pedagogical practices in the undergraduate students’ classrooms (Johnson & Johnson, 2002b, 2009; Smith et al., 2005). The literature suggests multifaceted pedagogical frameworks and the importance of the classroom culture for influencing how classroom practices could be shaped and adopted in the context.

Building on these, the current study, attempted to map out a quantitative model by drawing direct path connections from the pedagogical variables to the student outcomes, with an expectation that these constructs may relate positively. The model has six sub-components: Cooperative interaction (Copi), task orientation (Tori), academic challenge (Acha), teaching effectiveness (Teff), Satisfaction and Gains (Figure 1).

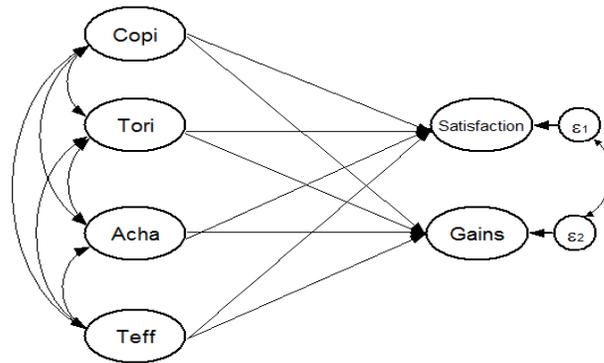


Figure 1. The quantitative study conceptual model with 4-pedagogic variables and 2-criterion outcomes. Ovals represent latent variables. ε1 and ε2 denote residual terms representing unmeasured influences on endogenous latent variables (Satisfaction and Gains).

The pedagogical components: Copi, Tori, Acha, and Teff are “predictor” variables and were measured by 4 composite factor scores. The cooperative interaction subscale consisted of 5 items ($\alpha = .86$), the task orientation subscale consisted of 5 items ($\alpha = .82$), the academic challenge subscale consisted of 3 items ($\alpha = .75$), and the teaching effectiveness subscale consisted of 3 items ($\alpha = .80$). Similarly, the two “outcome” variables: satisfaction and gains were measured by two composite factor scores, and Cronbach's alpha for the 5 satisfaction and 6 gains items were .88 and .81, respectively. Overall, these reliabilities are well above the minimum coefficient alpha ($\alpha = .70$) that is recommended for social sciences research (Nunnally & Bernstein, 1994).

Confirmatory Factor Analysis and Correlation Analysis

The quantitative model has been employed, primarily to provide explanations about why students participate in the CL activities and to suggest strategies for better results of such participation. This study obtained multiple measures for variables said to constitute the pedagogical components of participation in the CL activities. Because the pedagogical variables in this quantitative model are explanatory, their construct validity must be supported before we can have confidence that explanations based on this quantitative model reflect reality. For this, we used confirmatory factor analysis (CFA) and correlation analysis.

We used a principal component analysis (PCA) with varimax rotation, to assess the factor structure and identify the pedagogical components of the 24scale variables. The Kaiser-Meyer-Olkin measure for this group of measured variables has shown the sampling adequacy for the analysis ($KMO = .73$) (Kaiser, 1974). Also, Bartlett’s test of sphericity, $\chi^2(276) = 837.68, p < .001$, indicated that correlations between the items were sufficiently large for PCA. Items in each scale were

retained in the model if they had a loading of at least 0.4 on one factor and if at least three items measured it, regardless of its eigen value. An initial analysis was run on the 24 items to obtain eigen values for each factor in the data; four factors comprising 16 items had an eigen value over Kaiser’s criterion of 1 and had items 3 and above, and explained 69.23% of the variance. Based on Kaiser’s criteria components and the scree plot inflexions that justify retaining 4 factors, the final analysis retained the following four factors: cooperative interaction, task orientation, academic challenge, and teaching effectiveness. Table 1 shows the number of items that make each subscale, and the associated variance.

Table 1
Factor Loadings (Pattern Matrix) and Unique Variances for the Pedagogical Indicator Items (n =54)

Scale	Copi ¹	Tori ²	Acha ³	Teff ⁴	Uniqueness ⁵
copi1	.80	.18	.22	.13	.26
copi2	.68	.35	.02	.14	.40
copi3	.84	-.07	-.03	.28	.20
copi4	.71	.14	.08	.29	.38
copi7	.78	.27	.15	.00	.29
tori1	.21	.74	.33	.16	.28
tori2	.30	.47	.36	-.22	.51
tori3	.16	.83	-.03	.24	.23
tori4	.31	.69	.11	.33	.31
tori5	-.04	.74	.31	-.09	.35
acha3	.19	.11	.78	.06	.34
acha4	-.09	.26	.83	.07	.23
acha5	.21	.02	.78	-.01	.35
teff1	.35	.34	-.04	.72	.24
teff4	.06	.00	.13	.84	.27
teff5	.27	.20	-.01	.78	.29
Percent of Variance	21.67	18.51	14.69	14.36	
Eigen Value	3.47	2.96	2.35	2.28	

Note. Factor loadings > .40 are in boldface. ¹Copi = Cooperative interaction; ²Tori = Task orientation; ³Acha = Academic challenge; and ⁴Teff = Teaching effectiveness. ⁵Uniqueness refers to the variance that is ‘unique’ to the variable and not shared with other variables in the model.

As shown by the standardized score loadings of the set variables in Table 1, all items loaded on the four pedagogical factors well above the recommended level. For example, item 1 loaded at .80 on the factor, cooperative interaction, and item 5 loaded at .78 on the factor, teaching effectiveness. Thus, all item loadings exceeded .70, except for a few. Moreover, the uniqueness of each variable, representing the variance not shared with other variables in the factor model ranges from .20 to .51. These low levels of uniqueness, together with, the high factor loadings for most of the items used in the scales confirmed that each of the four pedagogical components was well defined by its set of items. The correlations among the pedagogical factors ranged from .15 to .52 (Figure 2).

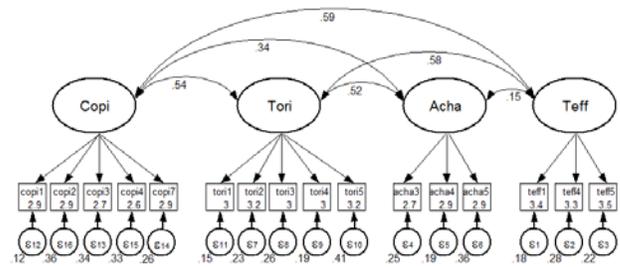


Figure 2. The correlations among the latent variables in the four-factor model. Ovals represent latent variables. Square represents observed variable. ε1, ε2, ε3, and so forth denote residual terms representing unmeasured influences on observed variables. Double head arrow represents correlations between latent variables.

The high positive correlation between teaching effectiveness and cooperative interaction, $r = .59, p < .05$, confirmed that the more teachers’ demonstrate effective teaching roles, the better their students interact cooperatively in classroom learning. However, the weak correlation between teaching effectiveness and academic challenge, $r = .15, p < .05$, indicated that the teachers’ effective teaching roles has minimal or a weak relationship to the emphasis placed on academic challenge. In contrast, the high correlation between academic challenge and task orientation, $r = .52, p < .05$, indicated that the higher the emphasis teachers placed on academic challenge, the more task oriented the students become.

Quantitative and Qualitative Data Analyses

We compared the scores for the six areas and examined the correlations of the pedagogical factors with the students’ outcomes. We also performed two separate multiple regression analyses for the two outcomes to determine, if the pedagogical components were effective overall, and to assess the strength of each pedagogical factor in predicting the outcome.

The researchers used prior research to develop coding schemes to guide the analysis and interpretation of the qualitative interview data. The codes were research driven codes used by others, and their findings provide the most direct help in developing codes for the present study. During the coding process, each interview transcript was analyzed in sentences or groups of sentences reflecting single ideas. These units were given a code to reflect that idea or concept (Strauss & Corbin, 1998) and the codes developed by other researchers helped as a reference point. Through constant comparative analysis (Merriam, 2002), each participant’s response was compared and connected to others across the emerged categories and descriptors based on the coding frame of others.

Results

Quantitative Results

The descriptive statistics showed that the two courses achieved higher scores in all the six components: cooperative interaction, task orientation, academic challenge, teaching effectiveness, satisfaction, and gains (Table 2). Although we emphasized all these six areas equally well, the descriptive results showed differential outcomes with the highest mean score being the teaching effectiveness scale ($M = 3.38, SD = 0.66$). Descriptive statistics and correlation analyses for the six areas are shown in Table 2.

Table 2
Means, Standard Deviation, Partial and Semipartial Correlations for Scores on Pedagogical Variables as a Function of Satisfaction and Gains (N = 54)

Pedagogical predictor	Satisfaction		Gains		M	SD
	Partial corr. ¹	Semi-partial corr. ²	Partial corr.	Semi-partial corr.		
Cooperative interaction	0.68	.52***	0.61	.52***	2.82	.81
Task orientation	0.62	.44***	0.52	.41***	3.07	.73
Academic challenge	0.02	.01	0.32	.23*	2.87	.74
Teaching effectiveness	0.64	.47***	0.34	.24*	3.38	.66
M	2.97		3.07			
SD	.75		.71			

Note.¹Correlation between each predictor and an outcome measure controlling for all other predictors; ²Correlation between each predictor and an outcome measure controlling the effects of all other predictors from the specific predictor, but not from the outcome measure. Means and standard deviations for the instructional variables are presented in the vertical columns, and means and standard deviations for satisfaction and gains are presented in the horizontal rows.

Significance levels. * $p < .05$, ** $p < .01$, *** $p < .001$

The partial correlation between each pedagogical variable and the student outcome was positive. Moreover, the semi-partial correlations between three of the four factors with satisfaction were statistically significant ($p < .001$) and ranged from .44 to .52. This indicated that, approximately 19% to 27% of the variance in satisfaction, in the sample, can be accounted for by any of the three pedagogical factors. Similarly, the semi-partial correlation of each pedagogical factor with learning gain was statistically significant ($p < .05$) and ranged from .23 to .52. This indicated that, approximately 5% to 27% of the variance in learning gain in the sample can be accounted for by the four pedagogical factors.

Two separate multiple regression analyses were conducted, simultaneously to test, if the pedagogical factors significantly predicted participants' ratings of satisfaction and gains over and above students' major field, age, and gender. Guided by the quantitative study model (Figure 1), our interest with these analyses was in identifying those pedagogical factors that may relate with the student outcomes. Specifically, we tested the following hypotheses:

Hypothesis 1: Sense of satisfaction attributed to students' participation in the CL condition are positively associated with a combined effect of four pedagogic measures, over and above the students' major field age and gender.

Hypothesis 2: Perceived gains in learning and personal development attributed to students' participation in the CL condition is positively associated with a combined effect of four pedagogic measures, over and above the students' major field, age and gender.

Predictor variable: Cooperative interaction, task orientation, academic challenge, teaching effectiveness, major field, age, and gender.

In order to include major field and gender in the regression models, one dummy variable was constructed for each. The base category for the gender dummy was male while that of major field was Sport Science. Dummy variables for gender were (0 = male, and 1 = female) and major field (0 = sport science, and 1 = psychology). The summary of regression results are shown in Table 3.

The first regression model revealed that the four pedagogic variables, together accounted for a significant proportion of the satisfaction variance, $R^2 = .73$, adjusted $R^2 = .69, F(7, 46) = 17.58, p < .001$. Similarly, the second regression model revealed that the same pedagogic variables, together accounted for a significant amount of the gains in variance, $R^2 = .58$, adjusted $R^2 = .52, F(7, 46) = 9.04, p < .001$.

Each measured pedagogical variable appeared to be a significant positive predictor of the students' gains scores ($\beta = .27, p = .016$), as did teaching effectiveness ($\beta = .29, p = .007$), task orientation ($\beta = .43, p < .001$), and cooperative interaction ($\beta = .61, p < .001$). Similarly, cooperative interaction significantly positively predicted the students' satisfaction scores ($\beta = .59, p < .001$), as did task orientation ($\beta = .48, p < .001$), and teaching effectiveness ($\beta = .49, p < .001$). The variable cooperative interaction made the highest predictions of satisfaction and gains ($.59 \leq \beta \leq .61, p < .001$). However, it seems that emphasis on academic challenge did not significantly relate to student satisfaction. Of the three controlling variables, only gender contributed for the predictions of satisfaction ($\beta = .17, p = .048$) such that male students reported greater satisfaction than female students. Regardless of this significant contribution, the other

Table 3
Multiple Regression Analyses for Variables Predicting Student Satisfaction and Gains (n = 54)

Predictor	Model 1 (Satisfaction)				Model 2 (Gains)			
	B	SE ³	β	T	B	SE	β	t
Major field ¹	0.09	0.19	.04	0.45	0.34	0.24	.17	1.41
Age	-0.05	0.05	-.08	-0.92	-0.02	0.06	-.04	-0.36
Gender ²	0.44	0.22	.17*	2.03	0.16	0.27	.06	0.58
Cooperative interaction	0.60	0.09	.59***	6.72	0.62	0.11	.61***	5.55
Task orientation	0.49	0.08	.48***	6.09	0.44	0.10	.43***	4.35
Academic challenge	0.00	0.09	.00	-0.04	0.28	0.11	.27*	2.5
Teaching effectiveness	0.50	0.08	.49***	5.92	0.30	0.11	.29**	2.84
R ²	.73				.58			
Adjusted R ²	.69				.52			
F change	17.58***				9.04***			

Note. ¹Sport Science is reference group; ²Male is reference group. ³Standard Error.
Significance levels. * $p < .05$, ** $p < .01$, *** $p < .001$

controlling variables did not contribute for the predictions.

Results of Qualitative Interview

Conceptual framework for qualitative analysis. In this study, the students' and teachers' interview transcripts were organized into three major themes: 1) general perceived values and attitudes on CL pedagogies (Gillies, 2006; Sharan, 2010a), 2) participants' lived transformative experiences as a result of participation in the CL classroom practices (Gillies, 2004; Johnson & Johnson, 1999); and 3) difficulties faced during implementation and ways to alleviate them (Gillies & Boyle, 2010; Johnson & Johnson, 2004; Sharan, 2010b). These conceptualizations provide theoretical outlines of the qualitative data and guide analyses in subsequent sections. In this analysis, the interview participants have been divided into two groups: 1) The teacher group (T) represents teachers' participants in the pilot intervention; and 2) Student group (S) represents the students who participated in the interviews.

Participants' perceived values and attitudes.

In the views of the interviewed teachers, the CL pedagogy created a positive learning environment for students to interact with, and encouraged cooperation in small groups. For example, one of the teachers (T2) said that the learning activity made students more comfortable as it gave them the opportunity to sharpen their ideas before sharing them with the whole class. The other teacher (T1) reported that the CL approach created a relatively easier learning atmosphere for the very shy and uncertain students to feel more confident and better prepared for the whole class discussion.

All the interviewed students saw their experiences with CL activities positively. They described that the CL activities were more enjoyable, more interesting, and more important. The participant students described different aspects of the CL experiences as being important. Of the stated items, the most prominent ones include sharing, positive relationships, increased interactions, active engagement, teacher support, and student-centeredness.

Participants' lived transformative experiences. The interviewed teachers acknowledged that the CL pedagogies were student-centered and provided opportunities for students to engage in different learning experiences. They also highlighted some teaching advantages, as well. As one of the interviewed teachers (T2) commented, the CL pedagogies offered support for teaching effectiveness by creating possibilities for coverage of a broader content, the sharing of teaching responsibilities with the students, and maintaining vertical integration that could help students to see the logical relationship between related ideas and concepts. In support of the latter issue, the other teacher (T1) added that the Jigsaw structure enabled the flow of content to be

unimpeded. However, the teacher interviewees' noted differences in the level of participation amongst the students; in such a way that some students participated more actively than others. Regardless of this notable difference, their students reacted to the CL pedagogies quite positively. For example, they showed a willingness to work with other classmate, sometimes providing support in arranging the classroom, and they were interested in learning.

Students' interview accounts verified that their participation in this initiative was their first exposure to CL. One male student (S4) described that engaging in the CL activities gave them the chance to get involved in one of the pedagogical approaches that are used to promote student-centered learning. Another female student (S1) clearly highlighted the desired changes when she says:

Changing from the previous (traditional) approach of teaching where we were expecting everything from the teacher, to an approach where we tried to work with our own. It was very interesting to sit and work together with other students instead of always sitting in front of the teacher and having contact only with the teacher.

Also, a female student (S5) noted: "Normally the teacher use to lecture, so we expect everything, from the teacher but in the small group learning we were encouraged to express ourselves rather than expecting from the teacher." In support of this and revealing engagement in challenging learning experiences, a female student (S2) explains:

In the small group learning, sharing what you know whereas other students may not know was very interesting. For example, the concept 'internal consistency' started with a discussion among the group members in the class and further discussion in dormitory around the assignment given. Such type of experience was an opportunity for us to learn new ways of approaching teaching and learning.

The interviewed students commented that there was increased student-student interaction in the CL activities. For example, a student (S6) describes:

In the Jigsaw lessons – I explained about cardiovascular tests while other members of my Jigsaw shared about other aspects of skill-related physical fitness such as strength, flexibility and speed. In those small-groups learning, we were given the chance to express ourselves, and that may be considered beneficial for the improvement of communication skills.

As one of the interviewed female students (S8) commented, through the CL activities, it was appealing and useful to see the active participation of those students who were low achievers, shy or silent listeners. On top of

this, the teacher encouraged them to accomplish the given learning tasks, and supervised their work and sometimes provided hints and additional information when needed. Another female student (S2) particularly stressed the importance of lessons designed in a way to promote students active involvement throughout the lesson.

Difficulties in implementation and ways to alleviate them. The interviewed teachers expressed their opinions regarding the challenges. One of the interviewed teachers (T2) commented: “The CL lessons took more time maybe that is because my students and I did not experience that before. In addition, the students’ interactions needed time and the culmination points needed to be meaningful.” To the other teacher, challenge was attributed to the nature of the subject matter. For example, in the Jigsaw lesson, the learning contents of ‘reliability estimation’ were tough for students to understand. Regardless of this, the teacher interviewees highlighted that some students did not meet their expectations of accepting individual responsibility while some others had a type of dependency syndrome. One of the interviewed teachers (T1) commented:

There was a dependency on the part of some students, which may be attributable to their learning styles. For example, some students might be auditory and would like to listen. The other attribution may be ability difference and the resulting difference in self-esteem. When you combine students of low academic ability with students of high academic ability, the students of low ability may have low self-esteem leading them to give more chances to speak to the able ones.

The teacher participants also affirmed that part of the reasons for students’ inability to take individual responsibility was because of teacher limitations in carrying out their facilitative role. For example, one of the interviewed teachers (T1) pointed out: “Many students of the different groups raised their hands simultaneously asking for help, which was difficult to be managed by a single teacher.” Also, the other teacher (T2) commented on his own teaching approach in the CL lessons:

At the start, I was more inclined to lecturing than thinking of the students learning experience. That might be one of the reasons for the less engagement of my students and some confusion created at the start. I recognized many of the responsibilities of a facilitator quite after sometime. Being able to facilitate my students learning through the CL activities was appealing and useful.

In addition, the interviewed teachers noted that the classroom set up was not suitable to conduct the CL activities due to inconvenient chair arrangements and untidy black and white boards. The boards inhibited the implementation of CL lessons, in terms of clearly

communicating instructions for the different learning tasks and the provision of brief information. The participant teachers utilized different strategies to alleviate challenges including, reduced provision of direct answers, instead adding more probing questions while they monitored and followed up students’ small group work.

They also perceived that their students made additional efforts, frequently pursued clarification on the discussion points, and helped each other by explaining and further elaborating issues. Moreover, it was suggested that, at the course design stage, the researcher should spend more time understanding the epistemology of the subject and endeavoring to differentiate pedagogies since that would provide the opportunity to maximize students learning. It was also suggested that students be included in the lessons review, at least, for the first 2-3 lessons.

Interviewed students identified four major challenges affecting the implementation of CL classroom practices. These include difficulty of the CL tasks, time constraints, students lacking background and necessary preparation, and teachers’ oversights in not concluding discussions. In terms of the CL tasks, a male student (S1) confirmed that the CL tasks were challenging since they demanded that they complete specific learning tasks, and thus were more time consuming compared to the regular activities in the lecture sessions. Also, another male student (S3) noted the challenge that originated from the required learning tasks because they were often unfamiliar to them.

As one interviewed female student (S2) and another interviewed male student (S8) described, all students were supposed to be responsible for their own learning, share responsibilities, and work towards a common goal, but a few students did not seem to be accountable for that. Another interviewed male student (S4) commented that the teacher sometimes did not conclude the lesson after taking different concepts or answers from students. Also, the interview participants gave general comments about the project and its future directions. An interviewed male student (S4) and another female student (S6) suggested that students need to be orientated to the CL pedagogies earlier. They also recommended that the CL activities should be embedded in lessons more than they were in their course, and other course teachers need to adopt a CL approach. Other comments about CL included, more opportunities for engagement of medium and low ability students and silent listeners, as opposed to teacher-led instruction.

Discussion This study examined the quality of teaching and learning of two courses developed according to a CL approach to instruction. Before the main analyses, the study explored the characteristics of the variables used in the scales. This study obtained an inter-correlated four-factor solution corresponding to the proposed pedagogical domains representing the construct. These multiple

indicators of CL pedagogies were shown to have strong convergent validity within each subscale (Table 1), as well as, discriminant validity from one another (Figure 2).

The moderate correlation between teaching effectiveness and cooperative interaction might be due to their intimacy and integration. As students become aware that their teachers genuinely care about their learning, they respond positively by exerting greater effort to reach their potential (Lumpkin, 2007). In contrast, the existing weak relationship between teaching effectiveness and academic challenge might be due to practical differences that effective teaching is about caring and interaction (Shulman & Shulman, 2004) while academic challenge is intellectual or a cognitive process (Hennessy & Evans, 2006). In effect, this may be because effective teaching is predominantly what the teacher does while engagement in academic challenge is exclusively what the student does (Biggs, 2012).

The descriptive statistics showed that CL pedagogies had meaningful benefits in terms of creating quality learning experiences for the students. These benefits largely emanated from cooperative interactions among students, their task orientation, emphasis on academic challenge, and teaching effectiveness. When these influences interact with instructional processes they greatly facilitated the students learning in class and increased their satisfaction and gains.

The regression findings of this study offered support for the hypothesized relations between academic challenges, teaching effectiveness, task orientation, cooperative interaction, learning satisfaction, and gains. Findings of the current study showed that aspects of quality teaching in the CL instruction were significant predictors of quality learning as described in terms of satisfaction and gains among students for the two departments' subgroups. All the independent variables included in the study were found significant as a predictor of learning satisfaction and gains for the sample groups. Therefore, both hypotheses 1 and 2 were supported.

For the sample students of both subgroups, scores on academic challenge, teaching effectiveness, task orientation, and cooperative interaction predicted scores on learning satisfaction and learning gains. Stated differently, the quality of teaching effectiveness, academic challenge, task orientation, and cooperative interaction had a meaningful impact on the learning satisfaction and gains of students.

This is consistent with previous findings in the literature on the field of CL in higher education. There is empirical evidence that shows the richness of diversity of CL methods and their multiple effects (Bullard & Bullock, 2004; Cavanagh, 2011; Johnson et al., 2007; Sharan, 2010a; Yamarik, 2007). In a meta-analysis of 117 intervention studies, Johnson and Johnson (2002a) reported differential effects of CL upon multiple students'

outcomes including academic achievement, interpersonal relationship, social support, attitude and self-esteem.

The finding from the study reported here indicated that the relationships among pedagogic variables and the measured outcomes show differential effects. For example, the students' perceived academic challenge in the CL activities seemed to have a significant positive effect on their self-reported gains, whereas no relationship was found on their satisfactions with the CL environment. Umbach and Wawrzynski (2005) presented similar results: Emphasis on higher-order activities does not significantly relate to perceptions of support or satisfaction, however, undergraduate students reported greater gains in general education in those institutions where teachers emphasized higher-order activities in their courses.

As the interviewed students noted, their learning experiences in the CL activities provided them several benefits. Of the stated items, the major ones include: The variety of activities, increased interpersonal relations, participating in small-group and whole-class discussion, and the teacher's support. Also, there are teaching benefits identified by the teacher participants, in terms of, increasing teaching effectiveness via creating opportunities for wider coverage of content, sharing teaching responsibilities with the students, and integration of ideas and concepts. These findings suggest that CL pedagogies enhance the ways teachers teach, and students engage with meaningful learning experiences. However, there are local constraints hindering the implementation of CL activities such as time, unfamiliarity, lack of preparation, and lack of equally sharing responsibilities for common goals.

In Ethiopian universities, classroom instruction takes a traditional content-centred approach, without due concern for the learning experience of the students (Moges, 2010). Moreover, there is a shortage of empirical work that shows whether changes in the approach to classroom instruction makes a difference (Kenea, 2009). The CL approach applied in this study, and the identified positive results for the students of the two courses provide an initial evidence-base to promote changes in classroom instruction from a traditional content-focused approach to a CL approach. Also, it used to be the case in the Ethiopian universities that the assessment of teaching quality assumes predominantly teaching behaviours and course contents (Zerihun et al., 2012). Thus, universities did not consider other parameters of teaching quality with quantitative assessment. This study found that the different aspects of CL implementation and the resulting outcomes could be effectively measured, and their relationships could be assessed. Therefore, these six areas can be included as important aspects of quality teaching and learning.

Study Limitations and Future Directions

Findings of the current study have implications for assisting students through the development of strategies that could facilitate the promotion of quality learning experiences as well as outcomes among students with the two sample subgroups. However, the study has limitations and therefore caution must be exercised in generalizing the findings of this study to other groups of undergraduate students in the studied context. The current study relied exclusively on self-report measures for its data. In addition, the lack of comparison group and random sampling coupled with a small sample size may have contributed significantly to bias in the design. Lastly, the inclusion of only students of two departments in the sample of the current study also limits the generalizability of the findings.

To help offset these limitations, future research should employ larger and more randomized samples across different departments to help improve the generalizability as well as decrease bias in the design. The incorporation of considerable numbers of female students into future research designs would also add to the overall scope of the findings and allow for further comparative analysis between genders and for the examination of any interaction effects between gender and discipline type that may exist. It may also be valuable in future research designs to obtain more demographic information regarding socioeconomic status, parental occupation, financial resources, language spoken at home, and social support networks. This information could provide greater clarity regarding the myriad of variables that contribute to quality teaching and learning. Longitudinal research designs would also help to better assess the influence of the CL conditions.

Conclusions

The quantitative and qualitative findings of the current study supported the contention that the CL intervention would help to improve the quality of teaching and learning within the undergraduate courses in Psychology and Sport Sciences programs. In addition, the findings suggest that an aspect of CL intervention predicts learning satisfaction and gains for students of Psychology and Sport Sciences who attended classroom instructions via CL pedagogies. In support of the CL literature, the findings of this study lend further assertions to the multidimensionality of CL intervention (condition) and to the utility of effective educational practice as an influence on the quality of learning outcomes. In addition, these findings further extend previous notions of CL that were considered imperative aspects of quality teaching and learning in earlier studies. These positive results reinforce the fact that the CL approach has a major impact in transforming the quality of teaching and learning, by refocusing teachers' attention on the pedagogical changes that are powerful to improve the quality of learning.

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