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EFFECTS OF COOPERATIVE LEARNING ON THE IMPROVEMENT OF INTERPERSONAL COMPETENCE AMONG STUDENTS IN CLASSROOM ENVIRONMENTS

Research Article

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COOPERATIVE LEARNING AND INTERPERSONAL COMPETENCE IN CLASSROOM ENVIRONMENTS

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Abstract

The purpose of this study is to examine the relationship between interpersonal competence and classroom cooperation activities. This study selected and evaluated sixteen university students in problem-based learning (PBL) course. The students answered the same questionnaire before and after the cooperative learning of PBL, and the changes in their interpersonal competence were measured. The statistical analysis involved a paired samples *t*-test. The results suggest that the cooperative learning of PBL develops students' interpersonal competence in a statistically significant way. A qualitative analysis of the students' responses to the questionnaire also reveals the students' changing attitudes toward cooperative learning in the classroom environment.

Keywords: cooperative learning, problem-based learning, interpersonal competence, agreeableness, extraversion

1. Introduction

Interpersonal competence is crucial in the process of human growth. The importance of interaction with others begins with family members at an early age and continues with friends and teachers in schools and later with members of professional workplaces. Interpersonal competence is, therefore, an essential part of relationships with others and in social activities as well.

Interpersonal competence is often defined as a particular communication ability in interacting with others in a manner intended to achieve certain results or objectives (McConnell, 2018). It is usually related to teamwork or leadership and very often called forth in cooperative works or collaborative student learning.

Research on effective leadership or teamwork very often concludes that interpersonal competence is one of the factors essential to the achievement of shared organizational goals in a corporate setting or in society in general (Britton, Simper, Leger, & Stephenson, 2017; Fought & Misawa, 2016). Fought and Misawa (2016) conducted in-depth interviews of library directors and discovered that interpersonal competencies, such as communication skills and the ability to foster strong relationships, are the most important factors for their success. The Teamwork KSA Test developed by Stevens and Campion (1994, 1999), a measurement of teamwork competencies for the effectiveness of groups and work teams, designates three of five interpersonal competencies: conflict resolution, collaborative problem solving, and communication.

Interpersonal competence is also a personality trait. Dumont defines personality traits as descriptive schemas, the product of human reason and imagination (Dumont, 2010), leaving

room for regarding interpersonal competence as belonging to a realm of conceptualization. McCrae and Costa (1999) identify four presuppositions of the concept of personality traits: (a) human nature is knowable; (b) humans are capable of making an objective judgment of their own and others' characters; (c) people differ widely in their numerous personality traits; and (d) there are spontaneous elements in much of human behavior in spite of pre-determined factors. The conception of interpersonal competence as a personality trait, therefore, is vulnerable to the long-lasting "nature versus nurture" controversy.

Since interpersonal competence is recognized as an important driver of achievement in society, schools have begun to provide students with various opportunities for cooperative learning in classroom environments. Socratous (2014) emphasizes the importance of interpersonal skills. He quotes Dewey (1940), who argued that schools are responsible for the development of students' interests in many areas of learning. Dewey also proposes that all students should be encouraged to expand their horizons in an appropriate manner and to equip themselves with interpersonal/communication skills in multiple student group interactions. Following Dewey, most educational institutions from elementary schools to universities have opened many collaboration-based courses and curriculum subjects. Colleges and universities have been especially committed to providing larger numbers of courses about interpersonal skills because they believe the near-future employers of their students will require the students' interpersonal skills in various professional environments.

Here, we need to think about the student's resistance to the changes the cooperative learning program intends to bring about; this resistance mostly derives from the deep-rooted personality traits. Personality traits are known as relatively permanent characteristics of an individual, which are mostly inherited and hardly changed by behavioral practice (Helmreich, 1984; Kichuk & Wiesner, 1997). The attributes of personality permanence were mentioned earlier by Allport (1937), who stated that a person's personality trait is a generalized and focalized neuropsychic system that works specifically in guiding his or her behaviors. Then, can any educational effort to improve students' interpersonal competence affect their consistent behavior pattern and really change the student's personality traits?

We may not be able to fundamentally change students' personality traits, but we can find an improvement in their behavior pattern within the specific period of our education program. Our research focuses on examining whether students' class activity utilizing cooperation strategies and techniques can work to improve their interpersonal competency enough to produce measurable differences in their learning in a classroom environment. Skinner, Hyde, McPherson, and Simpson (2016) once compared two different groups of students; one group was a collaboration-oriented cohort, while the other was a traditional ordinary peer group. The results of their study reveal that the collaboration-oriented cohort achieved significantly higher scores in interpersonal skills compared with the other group. By comparing two different learning conditions and groups, this study proves the effectiveness of cooperative learning.

Our research shares the same educational goal as Skinner et al. (2016), but we focus more on the individual student's change before and after cooperative learning of PBL. Though here we concentrate on an individual student's change in interpersonal competence, it will be possible to test our premise on a bigger scale by studying large classroom environments.

2. Theoretical background

2.1. Interpersonal competence as one of the personality traits

Traits are a way of thinking about an individual's personality (Dumont, 2010). Following Gordon Allport, theoreticians such as Raymond B. Cattell and Hans Eysenck developed

categories to understand the traits of an individual in a general sense. Allport's three trait levels (cardinal, central, secondary), Cattell's sixteen personality factors (16PF), and Eysenck's three personality factors (PEN: psychoticism, extraversion, & neuroticism) are some examples of their conceptualizations and categorizations. Later studies of personality traits by both Fiske (1949) and Digman and Takemoto-Chock (1981) based their studies on Cattell's data and theorized human personality in their Five-Factor Model; five factors of personality traits are neuroticism (i.e., degree of emotional stability), extraversion (i.e., assertiveness, sociability, sense of energy, excitement), openness to experience (i.e., imagination), agreeableness (i.e., good-nature, cooperation), and conscientiousness (i.e., dependability, responsibility) (Jensen, 2005). Malco, Gordesli, Arslan, Cekici, and Sunbul (2019) explain how interpersonal competence helps students to initiate and sustain interpersonal relationships, to overcome adverse experiences, to receive and provide social support, and to derive satisfaction from social relationships. Costa and McCrae (1992) focus on the factors of agreeableness and extraversion and define them as follows:

Extraverts are, of course, sociable, but sociability is only one of the traits that comprise the domain of Extraversion. In addition to liking people and preferring large groups and gatherings, extraverts are also assertive, active, and talkative. They like excitement and stimulation and tend to be cheerful in disposition. They are upbeat, energetic, and optimistic...Like Extraversion, Agreeableness is primarily a dimension of interpersonal tendencies. The agreeable person is fundamentally altruistic. He or she is sympathetic to others and eager to help them, and believes that others will be equally helpful in return. (p. 15).

As we can see from the quotation, extraversion and agreeableness have positive effects on cooperative learning. Our research chooses these two as representative factors of interpersonal competence and concentrates on them.

2.2. Problem-based learning (PBL) as a way of cooperative learning

Cooperative learning is a learning model in which students collaborate toward a common goal (Roger & Johnson, 1994; Siegel, 2005; Slavin, 1983; Socratous, 2014). Socratous (2014) argues that cooperative learning consists of five factors: positive interdependence, social skills, face-to-face interaction, individual accountability, and equal participation/opportunity. Any well-organized program of cooperative learning tries to cover all of these five factors, but it is not always successfully realized in a classroom situation.

PBL can be one of the methods to achieve the educational goal of cooperative learning, for PBL is based on cooperative activities and students' collaborative participation. PBL is a constructivist learning method, in which students study in groups by addressing or solving authentic and complex problems (Elder, 2009). In the 1960s, the McMaster University of Canada applied PBL theory to medical schools and found that various activities of PBL stimulated students to develop and learn skills of problem-solving, collaboration, and self-directed learning in addition to adaptive knowledge and higher motivation (Hmelo-Silver, 2004). It was also found that a close tie among students is an important component of the implementation of PBL. PBL can be an effective tool for cooperative learning, for it provides a scientific methodology and practical curriculum to realize the educational goal of cooperative learning.

2.3. Previous studies on interpersonal competence associated with cooperative learning

In the past, the education studies of interpersonal competence mostly focused on students' academic achievement (Huitt, Killins, & Brooks, 2015; Prixten, De Fraine, Van Damme, &

D'Haenens, 2010). There were only a few studies of interpersonal competence focusing on students' social skills. A study on the improvement of interpersonal competence by PBL activity (Skinner et al., 2016) was one of those few. Skinner and other researchers examined the social skills of the undergraduate students who experienced small group PBL tutorial sessions and compared them with those enrolled in traditional courses. They report that the PBL students' scores of interpersonal skills are significantly higher than those of other students in traditional courses, and there is a positive relationship between group-based learning and individual students' social skills. However, another study of interpersonal competence in a cooperative learning environment shows the opposite result. Lara (2013) analyzed the game performance of university students who played an educational game collaboratively, and she evaluated the students' personality traits. She found that extraversion and agreeableness were negatively affecting the students' game performance. Therefore, there is so far no agreement on the effect of cooperative learning on individual students' interpersonal competence.

3. Methods

3.1. Procedure and participants

This study examined sixteen participants from a general education course at S university, Seoul, Korea. The study required the selected students to fill out the same questionnaire twice, right before the cooperative learning of PBL and after the completion of the course. The questionnaire includes a measure of interpersonal competence. Students are informed that the study will use their questionnaires for improving teaching methodology. However, they do not know that the study will observe their interpersonal competencies, because that knowledge would provoke a biased response. The majority of the participants were female students ($n=10$, 63%), and mostly juniors and seniors ($n=13$, 81%). The second questionnaire included an extra descriptive question to obtain a deeper understanding of the change in the students' interpersonal competence by the end of the semester.

3.2. Measures

The study measured students' interpersonal competency with the instrument developed by a 10-item test of Halfhill and Nielsen (2007). Halfhill and Nielsen made five items for measuring the "agreeableness" category and another five items for the "extraversion" category. Their items were modifications of the NEO-Five-Factor Inventory Short Form (Costa & McCrae, 1992). Costa and McCrae made questionnaires for measuring personality traits, and the questionnaires led to their revised NEO personality Inventory (NEO PI-R) and NEO-Five-Factor Inventory (NEO-FFI). Their inventory divides personality traits into five categories: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Later, Halfhill and Nielsen chose three categories for their teamwork study: agreeableness, extraversion, and conscientiousness. However, they narrowed them down again and ended up with two categories, agreeableness and extraversion. Here, we accept their final version of the test and integrate their questionnaires on agreeableness and extraversion into our examination of the students' interpersonal competence.

Our questionnaire expects students to answer ten questions in a five-choice format ranging from 1 (strongly disagree) to 5 (strongly agree). A Cronbach's α was 0.74 for "agreeableness" and 0.84 for "extraversion." The questionnaire also included a descriptive question ("what was the best part of your PBL activity?") and an additional question about class satisfaction with options ranging from 1 (strongly dissatisfied) to 10 (strongly satisfied).

3.3. Analyses

In our research, the paired samples *t*-test examined the students' interpersonal competence. Tests occurred before the cooperative learning (BCL) and after the cooperative learning (ACL). The paired samples *t*-test compares two means of the same individual in order to decide whether the mean difference between paired observations on a particular outcome shows statistically significant differences (Paired samples *t*-test, n. d.).

Our study quantitatively analyzed the students' written responses to the descriptive question, which helped us to refine the established categorization. The principal researcher analyzed students' written responses and sorted them into two categories, agreeableness and extraversion. We used "The Adjective Check List Correlates of NEO-PI-R Facet Scale" (Costa & McCrae, 1992, p. 49) (table 1). Our study excluded other responses that were not relevant to personality traits. After analyzing the students' responses, the principal researcher delivered the initial findings to an educational specialist, who reviewed and evaluated them. This triangulation was performed to validate the data, and it is a necessary step in qualitative research to achieve a comprehensive understanding of the outcome (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014; Patton, 1999). After the triangulation, we reexamined the initial findings, modified our conclusions, and completed the finalized report on the qualitative research.

Table 1. *Adjective Check List for the analysis of the students' responses to the descriptive question*

Agreeableness facets	Adjective items	Extraversion facets	Adjective items
A1: Trust	<i>trusting</i>	E1: Warmth	<i>friendly</i>
A2: Straightforwardness	<i>demanding</i>	E2: Gregariousness	<i>sociable, talkative</i>
A3: Altruism	<i>generous</i>	E3: Assertiveness	<i>aggressive</i>
A4: Compliance	<i>intolerant</i>	E4: Activity	<i>energetic, active</i>
A5: Modesty	<i>show-off, clever</i>	E5: Excitement-Seeking	<i>pleasure-seeking</i>
A6: Tender-Mindedness	<i>sympathetic</i>	E6: Positive Emotions	<i>enthusiastic, praising, jolly</i>

Note. Adapted from *Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Factor Inventory (NEO-FFI)* by P.T. Costa and R.R. McCrae, 1992, p. 49. Copyright 1992 by Psychological Assessment Resources, Inc.

4. Results

Table 2 presents the statistics of all measured variables in the paired samples *t*-text. The average score of the students' class satisfaction was 9.19 out of 10; it means that average students were strongly satisfied with the cooperative learning of PBL. Table 3 presents the corresponding correlational coefficients.

Table 2. *Variables of paired samples t-test*

Variables	BCL/ACL	Mean	N	Std. Deviation
Class satisfaction	-	9.19	16	1.167
Agreeableness	BCL	21	16	2.757
	ACL	23.38	16	1.784
Extraversion	BCL	18.81	16	3.563
	ACL	20.25	16	3.173

Table 3. *Correlations between variables*

	1	2	3	4	5
1. Class satisfaction	-				
2. Agreeableness-BCL	-.062	-			
3. Agreeableness-ACL	-.183	-0.095	-		
4. Extraversion-BCL	0.156	.542*	0.085	-	
5. Extraversion-ACL	-.158	-0.046	.706*	.442	-

* $p < 0.05$

The goal of this analysis is to examine the effect of cooperative learning of PBL in improving interpersonal competence. As shown from the results presented in table 4, cooperative learning of PBL increased the students' "agreeableness" up to an average of 2.38. There was a 95% confidence interval for this variable, and the difference was (-3.619, -1.131). This result implies that the effect of cooperative learning of PBL on "agreeableness" is statistically significant ($p < 0.001$). Furthermore, cooperative learning of PBL also increased the students' "extraversion" up to an average of 1.44. In this case, the 95% confidence interval for the difference was (-0.048, -2.206). The increased interpersonal scores of the students' on the items "agreeableness" and "extraversion" statistically prove the importance of cooperative learning of PBL.

Table 4. *Statistic results of paired samples t-test*

Variables	BCL-ACL	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Agreeableness	BCL-ACL	-2.375	2.335	0.584	-3.619	-1.131	-4.069	15	0.001
Extraversion	BCL-ACL	-1.437	2.607	0.652	-0.048	-2.206	-2.206	15	0.043

The qualitative analysis of the responses to the descriptive question shows that all the students are positive about their experience of cooperative learning of PBL. 94% of the students gave positive comments on the item, “extraversion,” 38% of them on the item, “agreeableness,” and 31% of them on both items. Figure 1 shows the frequencies of the sub-domains of interpersonal competence. “Gregariousness (E2)” in the domain of “extraversion” is the sub-domain to which the largest number of students (11 of 16 students) showed a favorable response.

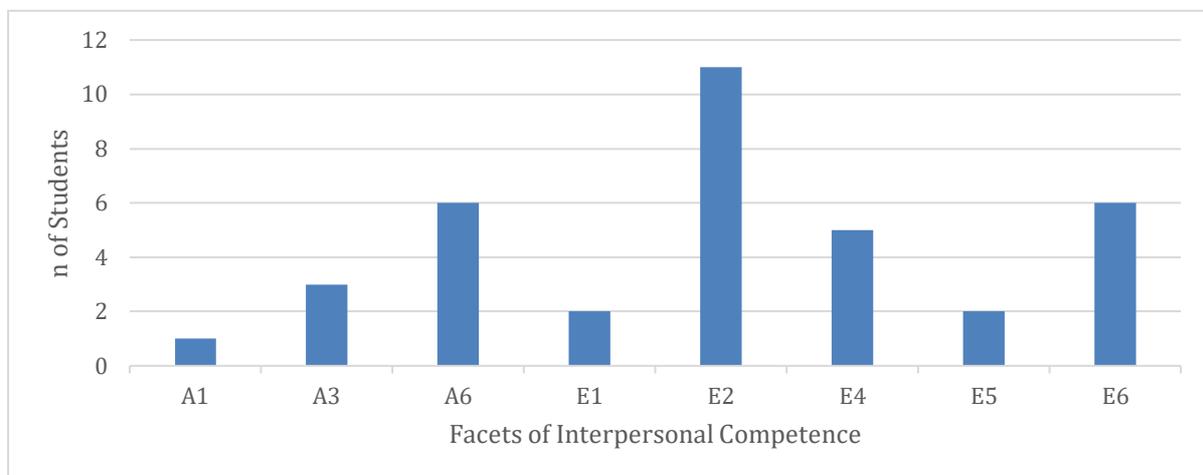
Figure 1. *Frequencies of sub-domains of Interpersonal Competence*

Table 5. *Students' responses to a descriptive question*

Domains (n of Students)	Students' Responses
Agreeableness (1)	Student a: We could get along with new friends.... I loved sharing opinions with different persons. (A6)
Agreeableness & Extraversion (5)	<p><i>Student b:</i> We enjoyed sharing our thoughts and encouraged each other's opinions... We were able to keep a bond among us... This is my first experience of team project. ... Our team members are all kind... They always made me smile during our meetings. (A1, A3, A6, E6)</p> <p><i>Student c:</i> The best part of our PBL activity was the teamwork. I was so thankful for the members' active engagement. The members were all kind and very supportive. (A3, A6, E4)</p> <p><i>Student d:</i> I loved the mood of our team. It was always friendly and cheerful. We all knew every member's ability and tried to assign the right work to the right person. ...we had many conversations... I tried to help team members. I found pleasure in understanding my team members. (A3, A6, E1, E2, E5, E6)</p> <p><i>Student e:</i> The group members were very friendly, so we all enjoyed our meeting. We could get along well. (A6, E2, E6)</p> <p><i>Student f:</i> I was pleased to experience this PBL activity... I was happy to communicate well...We were able to complete PBL without too much difficulty because we helped each other and shared our opinions so well. (A6, E2, E6)</p>
Extraversion (10)	<p><i>Student g:</i> This PBL activity created really friendly and cheerful atmosphere. (E1, E6)</p> <p><i>Student h:</i> There was no difficulty in our discussions. All the members talked a lot. (E2)</p> <p><i>Student i:</i> I was able to get closer to my group members. (E2)</p> <p><i>Student j:</i> We could talk and persuade others with different opinions and positions. (E2)</p> <p><i>Student k:</i> All the team members were helping each other and tried to make a good team. (E2)</p> <p><i>Student l:</i> First team work was very stressful, but I could learn how to deal with it. Now, I am very content with my communication ability. (E2, E4)</p> <p><i>Student m:</i> Everyone was quite active in expressing his or her opinions... No one was quiet during the meeting... Everyone was very enthusiastic and came up with creative ideas. (E2, E4)</p> <p><i>Student n:</i> The first adjustment was not easy, but a lot of meeting and talk helped us to work harmoniously together on the project. Sometimes our chatting delayed our discussion time, but our team project went well. We could learn how to respect each other. (E2, E6)</p> <p><i>Student o:</i> Everyone took an active part in the project. No one was missed at all. It was the most rewarding and satisfying group activity for two years... We came to know each other and were able to have a lot of fun. (E2, E4, E5)</p> <p><i>Student p:</i> I was very impressed by the members' passion and dedication for the project. (E5)</p>

5. Conclusion

The purpose of this study is to observe how the students engaged in cooperative learning improve their interpersonal competence with the help of cooperative learning techniques. This study measured the changes in the students' interpersonal competence before and after the co-operative learning sessions of PBL. The study also analyzed the students' responses to the descriptive question. The results of the study reveal the students' meaningful development in interpersonal competence ("agreeableness" and "extraversion") through the cooperative learning activities of PBL. Recent studies on cooperative learning since the 1970s have focused only on its academic and social outcomes (Gillies & Ashman, 2003). They usually conclude that cooperative learning leads to successful academic and social achievements (Gillies & Ashman, 1996; Gillies, 2006). This study, however, focuses more on the process of the students' development in interpersonal competence, and explains the relationship between cooperative learning and interpersonal competence in terms of the personality traits.

The analysis of the students' response to the descriptive question on cooperative learning proves that their interpersonal competence and social skills improve through their participation in cooperative learning activities. Students turn out to be more assertive, active, and expressive after the co-operative learning sessions of PBL. One of the students' comments sums up their learning: "Everyone took an active part in the project. No one was missed at all. It was the most rewarding and satisfying group activity for two years... We came to know each other and were able to have a lot of fun."

Figure 2 delineates the effects of cooperative learning of PBL on interpersonal competence. It explains how interpersonal competence develops with the help of the cooperative learning of PBL: the more students engage in cooperative learning, the higher the level of their interpersonal competence rises. Figure 2 also shows that the positive effects of cooperative learning on the development of the interpersonal skills naturally lead to the students' higher satisfaction with the class.

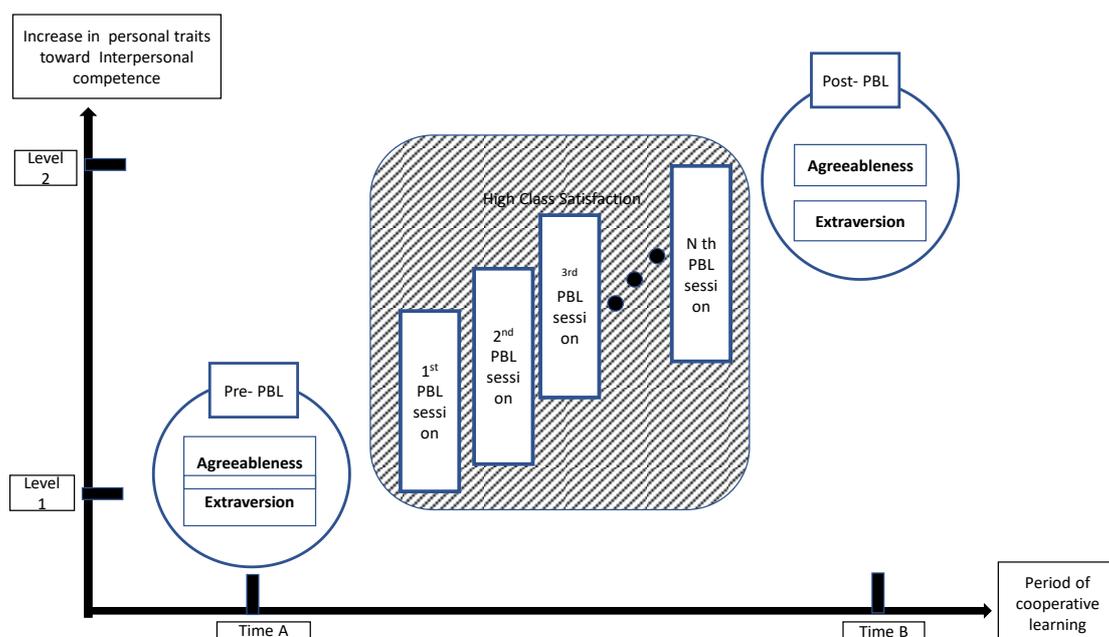


Figure 2. Schematic picture of the effects of cooperative learning on interpersonal competence

Our research proposes that students achieve significant growth in their interpersonal competence through the application of cooperative learning of PBL. However, we have to confine the relevance of our findings to a short-term educational period. Personality traits are relatively permanent characteristics, which are mostly inherited and hardly changed by any type of behavioral practice (Helmreich, 1984; Kichuk & Wiesner, 1997). However, our study suggests that Helmreich's and Kichuk and Wiesner's ideas about the relative permanence of personality traits may be wrong. Therefore, future research needs to expand the period of time and observe how cooperative learning develops students' interpersonal competence and improves their personality traits, making the most of the statistical significance revealed in our case study.

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