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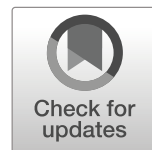
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Investigating the effects of achievement goals on team creativity and team achievement in learning communities at a South Korean university

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Abstract

Pursuing creativity through collaboration with others is an important learning goal in education. The purpose of this study is to investigate how team goal orientations are related to team creativity and team achievement in collaborative learning contexts with the aim of providing a supportive environment for creative learning. Learning communities were chosen for the study because they provide a context for collaborative learning, which is considered a high-impact educational practice. A path model was proposed to test the direct and indirect relationships between team goal orientations (mastery, performance-approach, and performance-avoidance), team interaction, and team learning outcomes (team creativity and team achievement). In particular, based on the literature review, the interactive relationship between the team mastery and team performance-approach goal orientations was included in the model. Data were collected from 589 college students divided into 175 teams who participated in learning communities at a South Korean university; these data were aggregated and analyzed at the team level. The path analysis results indicated that team mastery goal orientation was positively related to increased team interaction and team creativity, and the team performance-approach goal orientation was positively related to team creativity and team achievement. Interestingly, a significant interaction effect between the team mastery and team performance-approach goal orientations on team interaction was revealed. Team interaction was significantly related to team creativity but not to team achievement.

Keywords Team goal orientations · Learning communities · Team creativity · Team achievement

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Introduction

Motivation is a critical component in learning because it involves students' effort, engagement, and affect. Achievement goal theory is known to provide a framework for explaining students' motivation in achievement situations (Elliot and Harackiewicz 1996). Although achievement goal theory has evolved from a dichotomous conception (mastery vs. performance) to a 2×2 achievement goal framework, the trichotomous achievement goal framework, including mastery goals, performance-approach goals, and performance-avoidance goals, prevails in achievement motivation research (Dinger et al. 2013; Rogat et al. 2013). Mastery goals refer to when students focus on learning and mastering skills; performance-approach goals refer to when students demonstrate their abilities and are concerned that they receive superior feedback as compared with others; and performance-avoidance goals refer to when students aim to avoid negative feedback and failure (Dinger et al. 2013; Elliot and Church 1997; Elliot and Harackiewicz 1996).

Research has demonstrated distinct effects of different achievement goals in students' learning. Generally, mastery goals are linked to adaptive learning outcomes such as intrinsic motivation, persistence (Dweck and Elliott 1983), enjoyment (Barron and Harackiewicz 2001; Harackiewicz et al. 2002b), and use of deep learning strategies (Fennolar et al. 2007). Performance-approach goals have a strong positive effect on academic performance (Elliot and Church 1997; Harackiewicz et al. 2000; Linnenbrink-Garcia et al. 2008), although they are often related to high test anxiety (Huang 2012). Performance-avoidance goals are related to maladaptive outcomes, including the use of surface learning strategies and avoidance of help seeking (Church et al. 2001; Karabenick 2004; Middleton and Midgley 1997). Moller and Elliot (2006) note that achievement goals are powerful factors that predict learning behavior and outcomes, and that they are sensitive to learning contexts.

Although much attention has been paid to the achievement goal theory in educational research, it has not been fully investigated in collaborative learning environments. Currently, schools strive to provide creative and collaborative knowledge-building opportunities for students because collaboration is one key competency along with critical thinking skills, creativity, and communication skills (de la Harpe et al. 2000). Therefore, it is critical to understand students' motivation and learning behavior in collaborative learning contexts (Rogat et al. 2013).

As one type of collaborative learning experience in higher education, learning communities (LCs) have long been recognized as a high-impact educational practice in the USA (e.g., AAC&U 2007; Kilgo et al. 2015; Kuh 2008) and other countries (Muldoon and Wijeyewardene 2012; Seo and Kim 2018). Although LCs have been structured in various ways, either related to courses or extracurricular activities, they are generally a group of students with common learning goals who actively interact and collaborate to achieve these goals. Many previous studies (Inkelas et al. 2007; Knight 2003; Pike et al. 2008; Rocconi 2011; Zhao and Kuh 2004) discussed the benefits of participating in LCs, such as academic achievement, personal development, college attendance, and overall college satisfaction.

However, most studies noted that the effectiveness of LCs is limited to academic grades and persistence (Brownell and Swaner 2009); these studies also focused on individual learning even though LCs are collaborative in nature. Therefore, the present study attempts to shift the focus of LCs from individual learning gains to collaborative learning outcomes. This study chooses team creativity and team achievement as team-level learning outcomes of LCs, and it examines how achievement goals in team-based learning are related to such team learning

outcomes. Team achievement goals are defined as shared perceptions of goal orientations among team members. There are three types of team goal orientations: team mastery, team performance-approach, and team performance-avoidance goal orientations. LCs in universities are, by definition, team collaborations, but they may also experience between-group competition in terms of normative evaluation of activities in a class or public recognition of outstanding performance. Therefore, examining the role of team goal orientations in the authentic collaborative context such as LCs helps one understand and broaden the discussion on achievement goal theory in collaborative learning contexts. Moreover, this study can also provide suggestions for creative knowledge building in LCs.

Theoretical background

Achievement goal theory

Achievement goal theory explains students' learning behaviors according to their orientations toward learning and achievement (Dweck 1986; Geitz et al. 2016). Modern achievement goal theory suggests three different achievement goals: mastery, performance-approach, and performance-avoidance goals (Elliot and Harackiewicz 1996; Maehr and Zusho 2009). Students who pursue mastery goals aim to develop competency and learning knowledge. Students who pursue performance-approach goals aim to demonstrate their ability compared with others, whereas those who adopt performance-avoidance goals aim to avoid incompetence relative to others (Dinger et al. 2013; Elliot and Church 1997).

In the literature, these three achievement goals differently predict students' learning behavior and affect. Mastery goals are positively related to self-efficacy, cognitive engagement (Linnenbrink and Pintrich 2000), intrinsic motivation, persistence (Dweck and Elliott 1983), enjoyment (Barron and Harackiewicz 2001; Harackiewicz et al. 2002b), interest in class (Elliot and Church 1997), and deep learning strategies (Fennolar et al. 2007). While mastery goals are consistently related to adaptive outcomes, research shows that performance-approach goals are related to both desirable and undesirable learning outcomes. For example, performance-approach goals are positively related to task value (Church et al. 2001; Wolters et al. 1996), academic self-concept (Wolters et al. 1996), and academic performance (Elliot and Church 1997; Harackiewicz et al. 2000; Linnenbrink-Garcia et al. 2008), as well as to surface learning strategies, challenge avoidance (Dweck and Elliott 1983), and increased test anxiety (Huang 2012). Thus, some scholars (Harackiewicz et al. 2002a) have called for additional research to clarify the effects of performance-approach goals because of inconsistent research results on performance-approach goals (e.g., Middleton and Midgley 1997; Midgley et al. 2001). Meanwhile, performance-avoidance goals are related to increased anxiety, surface learning strategies, and avoidance of help seeking (Church et al. 2001; Karabenick 2004; Middleton and Midgley 1997).

Although achievement goals have distinct characteristics and functions in academic settings, multiple studies (Dinger et al. 2013; Geitz et al. 2016; Harackiewicz et al. 2002a) note that these goals are not mutually exclusive. Individuals may have multiple achievement goals and simultaneously reap the benefits of adopting both mastery and performance-approach goals to achieve desired outcomes (Barron and Harackiewicz 2001; Dinger et al. 2013; Harackiewicz et al. 2002a; Pintrich 2000). For instance, mastery goals positively predict interest, while performance-approach goals positively predict academic grades

(Harackiewicz et al. 2002a). Moreover, Elliot and Church (1997) reported a significant interaction effect between mastery goals and performance-approach goals. This implies that the effects of multiple achievement goals are not determined in a linear way but rather through interactive relationships between mastery and performance-approach goals. Thus, further research is needed to investigate the interactive relationship between these two goals.

When students work together, team-level achievement goal orientations can emerge (Bunderson and Sutcliffe 2002). Because students' achievement goals can be adapted by other team members within a team as well as by other team factors, team goal orientations are not equivalent to the average of individuals' achievement goals within a team, but they are defined as a collective state of shared perceptions about the team members' goals (Gong et al. 2013). As with the individual achievement goal theory, scholars categorized three types of team goal orientations: mastery, performance-approach, and performance-avoidance orientations. This categorization depends on whether a team pursues the development of skills, knowledge, and competence; the accomplishment of superior performance; or the avoidance of negative evaluation and failure, respectively (Gong et al. 2013).

Although little research on team goal orientations has been conducted in schools, these orientations affect team behaviors that include information exchange, effective communication, and quality of work planning and cooperation (Kempner et al. 2003). Hijzen et al. (2007) interviewed effective and ineffective teams in team learning activities and reported that effective teams showed high levels of mastery goal orientation and strong responsibility for achieving shared goals. In contrast, ineffective teams had performance-avoidance goal orientations and showed less relevant behaviors to the team tasks and frequent behaviors of social bonding. Kempner et al. (2003) reported that students who shared the perception of their team having a performance-approach goal orientation were behaviorally disengaged, while students who had a shared perception of mastery goals were less behaviorally disengaged.

One issue regarding achievement goal theory in team learning contexts is between-group competition (Rogat et al. 2013). Collaborative learning scholars (Deutsch 1949; Slavin 1996) suggested that between-group competition promotes group cohesion and decreases social loafing, whereas achievement goal theorists claimed that between-group competition such as public recognition of outstanding teams or announcement of team ranking may motivate students to adopt performance-approach goals rather than mastery goals (Linnenbrink 2005). Linnenbrink (2005) tested the effects of achievement goals with competition and found that a combined mastery-performance classroom condition that received improvement points and normative performance evaluation fostered both mastery goals and performance-approach goals. These results suggest that collaborative learning such as through student teams-achievement divisions (STAD) may increase both team mastery and performance-approach goal orientations. However, the role of achievement goals in a collaborative learning environment has not yet been fully explored in higher education; more cumulative research is needed to gain a good understanding of team goal orientations within specific learning and achievement situations (Geitz et al. 2016; Rogat et al. 2013). Thus, the present study investigates the effects of team goal orientations in LCs in higher education.

Learning communities

LCs are widely implemented in colleges and universities (Matthews et al. 2012; Seo and Kim 2018; Smith et al. 2004) and recognized as a high-impact educational practice in higher education (Association of American Colleges and Universities 2007; Kuh 2008). Although

there are varied definitions of LCs, they are described as an “intentionally developed community that exists to promote and maximize the individual and shared learning of its members. There is ongoing interaction, interplay, and collaboration among the community’s members as they strive for specified common learning goals” (Lenning et al. 2013, p. 7). Usually, LCs in higher education comprise a group of students who are gathered according to their interests, particularly major-related topics.

Previous studies on LCs discussed their diverse educational effectiveness. Participation in LCs is positively related to higher grade point averages (GPAs; Inkelas et al. 2007; Knight 2003; Seo and Kim 2018), more time and effort spent in courses (Inkelas et al. 2007; Tinto and Russo 1994; Zhao and Kuh 2004), higher satisfaction with college (Inkelas et al. 2007; Zhao and Kuh 2004), and higher persistence and graduation rates (Inkelas et al. 2007; Love 2012; Knight 2003). Moreover, participation in LCs enriches deeper learning (Chapman et al. 2005; MacGregor et al. 2000; Mahoney and Schamber 2011), writing ability (Tinto and Russo 1994), and student engagement (Rocconi 2011; Zhao and Kuh 2004). LCs promote peer interaction (Pike et al. 2008; Tinto and Russo 1994; Zhao and Kuh 2004), faculty interaction (Inkelas et al. 2007; Pike et al. 2008; Zhao and Kuh 2004), and perception of a supportive school environment (Inkelas et al. 2007; Zhao and Kuh 2004), which helps students settle into their college life and fosters intellectual development. Furthermore, the values and potential of LCs have recently expanded (Matthews et al. 2012). LCs are effective in increasing openness to diversity and interpersonal development (Whitt et al. 2001) and in developing key competencies, lifelong learning skills, and transferable skills (Kember 2009; AAC&U 2007).

Team learning outcomes in learning communities

LCs are characterized as *social*, *interactive*, and *collaborative* student experiences in universities (Smith and Bath 2006). They can be valuable opportunities to nurture self-directed learning and lifelong learning skills and to experience co-constructed knowledge and creative learning processes. Thus, the framework of examining LCs should move beyond considering GPAs and dropout rates and include team-level learning outcomes. In this study, team creativity and team achievement have been chosen as LC learning outcomes.

Team creativity

Creativity is recognized as one key competency in contemporary society (McWilliam and Dawson 2008; Zacher and Johnson 2015), and it is a central focus of higher education (European University Association 2007). However, Jackson (2006) criticized that creativity is rarely chosen as an explicit objective of the learning and assessment process. Creativity should be emphasized and explicitly stated as a core value for learning outcomes throughout the learning process.

Working as a team is beneficial for producing creative solutions through the integration of collective ideas and abilities of team members; thus team-based projects and collaborative learning have increased, and research on creativity has shifted from individual-level to group-level creativity (Csikszentmihalyi 1996; Kurtzberg and Amabile 2001). Team creativity refers to a shared perception of the collaborative efforts of team members to solve problems in new ways and to pursue creative learning outcomes (Shin and Zhou 2007). Individual creativity may be related to team creativity (Taggar 2002), but team creativity is not just the accumulation of individual creativity. Team creativity can be affected by various team factors,

including team developmental feedback, team cohesion (Senior et al. 2012), leadership (Paulus et al. 2012), and supportive climates for creativity (Hunter et al. 2007). Hirst et al. (2009) argued that team creativity could vary depending on team goal orientations, and the team mastery goal orientation was expected to foster team creativity. This study chooses team creativity as an important learning objective to pursue in LCs, and it examines how team creativity could be enhanced in LCs.

Team achievement

Typical examples of measuring academic achievement in universities are exam scores and GPAs. However, in collaborative learning contexts, the assessment of final learning products from teams is the most important learning achievement. Thus, in this study, the assessment of LCs' final reports was used to determine team achievement. The final reports reflect how teams explore interesting and challenging questions, find possible explanations and solutions, and construct knowledge. Although few previous studies investigated the relationship between team goal orientations and team achievement in LCs, the performance-approach goal orientation is expected to be positively related to team achievement—this is because some research that used essays, projects, and presentations, rather than exam scores (Barron, Schwab, & Harackiewicz, 1999; Elliot et al. 1999), exhibited the positive effects of performance-approach goals on achievement.

Research questions and the model

This study investigates the relationship between team goal orientations (mastery, performance-approach, and performance-avoidance goal orientations), team interaction, and LCs' team learning outcomes (team creativity and team achievement). It established direct and indirect paths between variables and specifically tested the interactive relationship between team mastery and team performance-approach goal orientations (see Fig. 1) by reflecting multiple goal perspectives (Elliot and Church 1997; Harackiewicz et al. 2002a). The research questions (RQs) are as follows:

- RQ1: How are team goal orientations (mastery, performance-approach, and performance-avoidance goal orientations) related to team interaction?
- RQ2: Is there a significant interaction effect between the team mastery and team performance-approach goal orientations on team interaction?

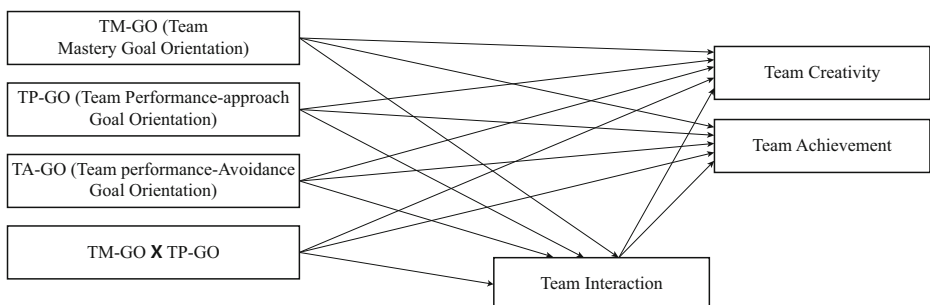


Fig. 1 Research model

- RQ3: How is team interaction related to team learning outcomes (team creativity and team achievement)?
- RQ4: How are team goal orientations related to team learning outcomes (team creativity and team achievement)?
- RQ5: Is there a significant interaction effect between the team mastery and team performance-approach goal orientations on team learning outcomes?

Methods

Participants and procedure

This study was conducted at a 4-year private university near Seoul, South Korea. The sample was drawn from participants in LCs organized by the college of sciences at the target university from the second semester of 2016 to the first semester of 2018. Since South Korean educational institutions recognize the benefits of LCs, the college of sciences at the target university runs its own students' LC program every semester. In the beginning of the semester, students voluntarily apply for the LC program as a team, and a director of the program reviews the teams' study plans, selecting approximately 60 teams. Each team can comprise three to five students, and students can team up with other students from the same major or from different majors in the college of sciences. The LC program lasts for approximately 12–13 weeks, and students in LCs submit a mid-term progress report as well as their reflection journals and reports of team learning outcomes at the end of the program. The director of the program appoints four to six professors from the departments to evaluate students' final reports and select outstanding work. Approximately 10 outstanding teams are chosen per semester, and the selected teams share what they have learned in a public presentation. All students and faculty from the college of sciences are invited to the presentation, and final awards are granted.

During the research period, 702 students on 199 teams participated in the LC program. Participation in the research was voluntary, and consent was obtained prior to the surveys. Surveys were administered at the end of each LC program. Among the 589 respondents from 175 teams, 237 were men (40.2%) and 352 were women (59.8%). They comprised 133 freshmen (22.6%), 151 sophomores (25.6%), 168 juniors (28.5%), and 137 seniors (23.3%). Their majors were physics, chemistry, bio-nanotechnology, life science, and food engineering. The respondents ranged between the ages of 17 and 28 years ($M = 21.6$).

Instruments

The data in this study were collected in two ways as follows: team goal orientations, team interaction, and team creativity were measured by a questionnaire, and team achievement was determined by a panel evaluation. Twenty items in the questionnaire were in Korean and measured with a 7-point Likert scale ranging from 1 (*completely disagree*) to 7 (*completely agree*). The questionnaire was reviewed by three faculty members in the field of education to check the content validity.

Team goal orientations

Three team goal orientations were measured as follows: mastery, performance-approach, and performance-avoidance goal orientations. The items were taken from Bunderson and Sutcliffe

(2002) and Gong et al. (2013) and modified according to the college LC setting. Confirmatory factor analysis (CFA) was performed to validate the three dimensions of team goal orientations. The CFA results revealed an adequate model fit: $\chi^2 (62, N = 589) = 257.56, p < 0.001$, CFI = 0.94 (> 0.90), RMSEA = 0.07 (< 0.08), and SRMR = 0.07 (< 0.08). Multiple fit indices, such as the comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR), were used to assess the model fit, because chi-square statistics are sensitive to sample size (Hair et al. 2009). The values of CFI (> 0.90), RMSEA (< 0.08), and SRMR (< 0.08) indicated a good fit (Hair et al. 2009). The factor loadings were all significant at the significance level of 0.05. Five items were used to measure team mastery goal orientation; a sample item was “Our team likes challenging and difficult topics that promote our learning of new things.” Cronbach’s α was 0.87. Four items were used to measure team performance-approach goal orientation; a sample item was “Our team is concerned with showing that it can perform better than other teams.” Cronbach’s α was 0.88. Four items were used to measure team performance-avoidance goal orientation; a sample item was “Our team thinks that not doing difficult subjects is better than getting bad evaluations.” Cronbach’s α was 0.74.

Team interaction

Three items from You (2017) were used to measure team interaction during LCs. A sample item was “Our team has actively contacted team members both offline and online to carry out team tasks.” Cronbach’s α was 0.86.

Team creativity

To measure team creativity, four items were taken from Shin and Zhou (2007). A sample item was “Our team discussed many creative ideas during the learning community activity.” Cronbach’s α was 0.89.

Team achievement

Team achievement was determined by the evaluation of final reports from each LC. The evaluation criteria were academic values and challenges of the chosen topic, level of engagement with LC activities, quality of the materials used, reflections on LC activities, and presentations. The interrater reliability, calculated from the second semester of 2016 to the first semester of 2018, was 0.92, 0.77, 0.77, and 0.91 for each semester, respectively. Among the 175 teams, 28 were recognized and received outstanding team achievement rewards. Teams with rewards were coded as 1, and teams without rewards were coded as 0.

Control variable

Since the team size tends to be related to team behaviors and performance in team research (Wheelan 2009), team size was used as a control variable in the analysis. The average team size was approximately four members ($M = 3.98$). Additionally, as control variables, the team’s gender composition (0 = “homogeneous,” 1 = “heterogeneous”) and the average of team members’ GPAs in the previous semester’s major-related courses were entered to control their possible influence on team interaction and team learning outcomes. Among the 175 teams, 101

teams were of the same gender, and 74 teams were mixed gender. The average of the teams' GPA was 3.41($SD = 0.36$).

Level of analysis and data aggregation

The research variables in the present study are meaningful at the team level. Before aggregating data, within-team agreement ($r_{wg(j)}$) and interrater reliability [ICC(1) and ICC(2)] were examined to review the validity of aggregation (Bliese 1998; Klein and Kozlowski 2000). The recommended cut-off value for $r_{wg(j)}$ is > 0.70 ; typical ICC(1) ranged between 0.05 and 0.20 (median = 0.12). The recommended value for ICC(2) is > 0.60 (James et al. 1993). However, Bliese (1998) discussed that high ICC(2) values are seldom found in small group research, and high $r_{wg(j)}$ and significant between-team variability (F -statistics) can justify data aggregation (Bliese 1998; Klein and Kozlowski 2000).

Team mastery goal orientation varied significantly across teams [$F(174, 413) = 2.02$, $p < 0.001$]; the value of $r_{wg(j)}$ was 0.87, that of ICC(1) was 0.23, and that of ICC(2) was 0.50. Team performance-approach goal orientation differed significantly between teams [$F(174, 413) = 1.79$, $p < 0.001$]; $r_{wg(j)} = 0.74$, ICC(1) = 0.19, and ICC(2) = 0.44. Team performance-avoidance goal orientation also differed significantly between teams [$F(174, 413) = 1.53$, $p < 0.001$]; $r_{wg(j)} = 0.80$, ICC(1) = 0.14, and ICC(2) = 0.35. Team interaction varied significantly across teams [$F(174, 413) = 1.60$, $p < 0.001$]; $r_{wg(j)} = 0.87$, ICC(1) = 0.20, and ICC(2) = 0.46. Finally, team creativity varied significantly between teams [$F(174, 413) = 1.73$, $p < 0.001$]; $r_{wg(j)} = 0.82$, ICC(1) = 0.18, and ICC(2) = 0.42. After reviewing the analysis of variance F -statistics, $r_{wg(j)}$, ICC(1), and ICC(2) values, data aggregation was justified and performed (Bliese 1998; Klein and Kozlowski 2000).

Data analysis

Data analysis was performed in four steps. First, data were aggregated and resulted in 175 team-level data. Second, descriptive statistics and correlation analyses were conducted using IBM SPSS Statistics 23.0 for Windows. Third, all variables except dependent variables were mean-centered prior to the analysis, and the product term was generated by multiplying the team mastery goal orientation and team performance-approach goal orientation variables. Last, path analysis was conducted using AMOS 23.0. Direct effects were tested, and indirect effects were tested using a bootstrapping method with a confidence interval at the significance level of 0.05.

Results

Descriptive statistics and correlation analysis

The descriptive statistics of the research variables are presented in Table 1. Twenty-eight out of 175 teams received outstanding team achievement awards, and the average team size was 3.98 (ranged from 3 to 5). The absolute values of skewness were less than 2.0, and the absolute values of kurtosis were less than 7.0, indicating that they met the multivariate normality assumption (Finney and DiStefano 2006). The correlation of team creativity with the team mastery goal orientation was 0.81 ($p < 0.001$), that with the team performance-approach goal

Table 1 Descriptive and correlational analysis results ($N = 175$)

Variables	1	2	3	4	5	6	7	8	9
1. Team mastery goal orientation	1.00								
2. Team performance-approach goal orientation	0.51**	1.00							
3. Team performance-avoidance goal orientation	- 0.04	0.22**	1.00						
4. Team interaction	0.66**	0.35**	- 0.02	1.00					
5. Team creativity	0.81**	0.52**	- 0.04	0.73**	1.00				
6. Team achievement	0.10	0.23**	- 0.07	0.07	0.12	1.00			
7. Team size	0.12	0.13	0.02	- 0.02	0.10	0.05	1.00		
8. Team composition	0.20**	0.12	- 0.03	0.12	0.21**	0.07	0.25**	1.00	
9. Team GPA	0.27**	0.21**	0.02	0.08	0.25**	0.23**	0.01	0.26**	1.00
Mean	5.54	4.84	4.59	6.11	5.53	0.16	3.98	0.42	3.41
SD	0.61	0.80	0.66	0.59	0.66	0.37	0.81	0.50	0.36
Skewness	- 0.12	- 0.19	0.03	- 0.73	- 0.25	1.87	0.03	0.32	- 0.02
Kurtosis	0.16	0.31	0.92	0.59	0.39	1.52	- 1.46	- 1.92	- 0.10

** $p < 0.01$

orientation was 0.52 ($p < 0.001$), that with the team performance-avoidance goal orientation was - 0.04 (*ns*), and that with team interaction was 0.73 ($p < 0.001$).

Path analysis

Analysis of the proposed path model showed good fit indices [$\chi^2(1, N = 175) = 0.02$ ($p = 0.89$), CFI = 1.00, RMSEA = 0.00, SRMR = 0.001]. Results of direct path analysis are presented in Table 2. Team mastery goal orientation was positively related to team interaction ($B = 0.65$, $t = 9.79$, $p < 0.001$), but team performance-approach goal orientation ($B = 0.04$, $t = 0.83$, $p = 0.41$) and team performance-avoidance goal orientation ($B = 0.01$, $t = 0.17$, $p = 0.87$) were not significantly related to team interaction. The interaction effect between the team mastery and team performance-approach goal orientations on team interaction was significant ($B = - 0.11$, $t = - 2.00$, $p = 0.04$). Team interaction had a significantly positive correlation with team creativity ($B = 0.41$, $t = 7.05$, $p < 0.001$) but not with team achievement ($B = 0.02$, $t = 0.29$, $p = 0.77$). For the direct effects on team creativity, team mastery goal orientation ($B = 0.50$, $t = 7.79$, $p < 0.001$) and team performance-approach goal orientation ($B = 0.12$, $t = 3.17$, $p = 0.002$) were positively related to team creativity, whereas team performance-avoidance goal orientation was negative but not significantly related to team creativity ($B = - 0.04$, $t = - 1.07$, $p = 0.29$). Regarding team achievement, only the team performance-approach goal orientation was significantly related to enhanced team achievement ($B = 0.13$, $t = 3.20$, $p = 0.001$).

For interpretation of the interaction between the team mastery and team performance-approach goal orientations on team interaction, simple slopes are plotted in Fig. 2. The graph shows that when teams had low team mastery goal orientation, lower team interaction was exhibited if the teams also had low team performance-approach goal orientation, as compared with teams with high team performance-approach goal orientation.

Since there are a few indirect paths on team creativity and team achievement via team interaction, the indirect coefficients were examined. The results in Table 3 show that only the

Table 2 Direct path coefficients and t values ($N = 175$)

Direct path	<i>B</i>	<i>SE</i>	β	<i>t</i>
TM-GO → Team interaction	0.65	0.07	0.66	9.79***
TP-GO → Team interaction	0.04	0.05	0.06	0.83
TA-GO → Team interaction	0.01	0.05	0.01	0.17
TM-GO × TP-GO → Team interaction	-0.11	0.05	-0.11	-2.00*
TM-GO → Team creativity	0.50	0.06	0.46	7.79***
TP-GO → Team creativity	0.12	0.04	0.15	3.17**
TA-GO → Team creativity	-0.04	0.04	-0.04	-1.07
TM-GO × TP-GO → Team creativity	0.01	0.04	0.01	0.12
TM-GO → Team achievement	-0.08	0.07	-0.13	-1.21
TP-GO → Team achievement	0.13	0.04	0.28	3.20**
TA-GO → Team achievement	-0.07	0.04	-0.13	-1.74
TM-GO × TP-GO → Team achievement	-0.07	0.04	-0.11	-1.49
Team interaction → Team creativity	0.41	0.06	0.37	7.05***
Team interaction → Team achievement	0.02	0.06	0.03	0.29
Team size → Team interaction	-0.09	0.04	-0.12	-2.14*
Team size → Team creativity	0.02	0.03	0.03	0.61
Team size → Team achievement	0.02	0.03	0.03	0.44
Team composition → Team interaction	0.04	0.07	0.04	0.58
Team composition → Team creativity	0.04	0.06	0.03	0.78
Team composition → Team achievement	-0.02	0.06	-0.02	-0.27
Team GPA → Team interaction	-0.19	0.10	-0.11	-1.90
Team GPA → Team creativity	0.10	0.08	0.05	1.25
Team GPA → Team achievement	0.22	0.08	0.22	2.82**

TM-GO, team mastery goal orientation; TP-GO, team performance-approach goal orientation; TA-GO, team performance-avoidance goal orientation

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

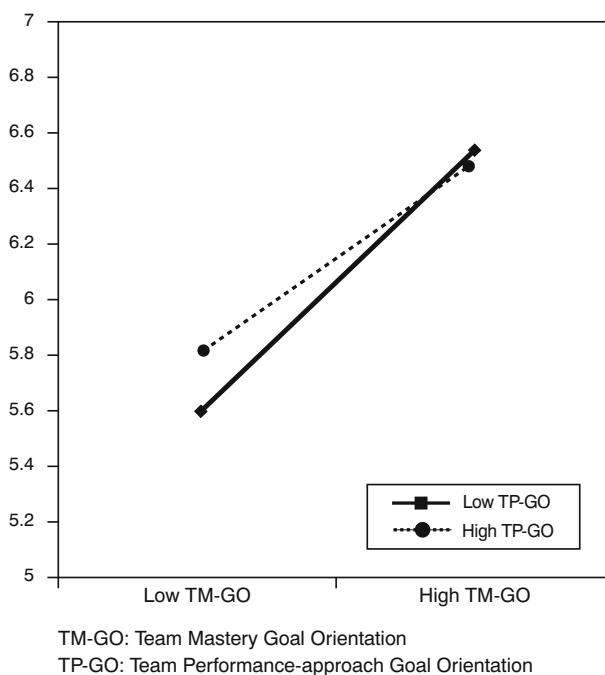


Fig. 2 Simple slope plot of the effect of interaction between team mastery goal orientation and team performance-approach goal orientation on team interaction

Table 3 Indirect path analysis results ($N = 175$)

Indirect path	<i>B</i>	<i>SE</i>	β	95% CI Bias-corrected percentile method
TM-GO $\rightarrow$ Team creativity	0.27**	0.05	0.25	0.18–0.38 ($p = 0.002$)
TM-GO $\rightarrow$ Team achievement	0.01	0.04	0.02	–0.07–0.08 ($p = 0.79$)
TP-GO $\rightarrow$ Team creativity	0.02	0.03	0.02	–0.04–0.07 ($p = 0.45$)
TP-GO $\rightarrow$ Team achievement	0.00	0.00	0.00	–0.01–0.02 ($p = 0.54$)
TA-GO $\rightarrow$ Team creativity	0.00	0.02	0.00	–0.04–0.05 ($p = 0.81$)
TA-GO $\rightarrow$ Team achievement	0.00	0.00	0.00	–0.01–0.01 ($p = 0.69$)
TM-GO $\times$ TP-GO $\rightarrow$ Team creativity	–0.05	0.03	–0.04	–0.09–0.02 ($p = 0.16$)
TM-GO $\times$ TP-GO $\rightarrow$ Team achievement	0.00	0.01	0.00	–0.02–0.01 ($p = 0.74$)

TM-GO, team mastery goal orientation; TP-GO, team performance-approach goal orientation; TA-GO, team performance-avoidance goal orientation

** $p < 0.01$

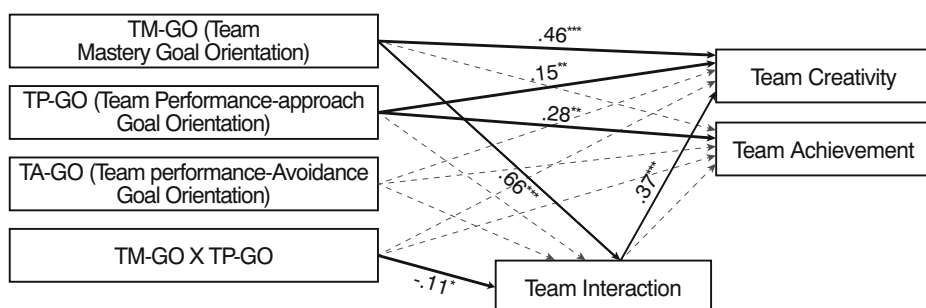
indirect effect of the team mastery goal orientation on team creativity was positively significant ($B = 0.27$, $p = 0.002$), because the confidence interval did not include 0 (0.18–0.38). The model with path coefficients is presented in Fig. 3.

Discussion

The purpose of this study was to examine how team goal orientations were related to team creativity and team achievement in LCs. Path analysis was used to analyze the relationships between the research variables in a study of 175 teams composed of South Korean college students.

According to the findings, the answers to the RQs are as follows. First, among the three team achievement goals, only the team mastery goal orientation was significantly related to enhanced team interaction. This result is consistent with previous studies that reported the benefits of mastery goals (Kempler et al. 2003), and it indicates that team members would actively communicate and collaborate with each other if the team aimed toward mastery goal orientation.

Second, although the team performance-approach goal was not significantly related to team interaction, this should be interpreted carefully because of the significant interaction effect



Note. Control variables are not shown in the figure, but they were included in the model for the analysis.

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

Fig. 3 The standardized direct path coefficients in a final model

between the team mastery and team performance-approach goal orientations. Some scholars discuss the multiple goal perspective, but few studies tested and/or proved the significant interaction effects between mastery goals and performance-approach goals. The findings of this study demonstrate that team interaction significantly drops when teams have both low levels of team mastery and team performance-approach goal orientations, whereas high team interaction appears when teams have a high team mastery goal orientation, regardless of the level of the team performance-approach goal orientation. These results reveal that the effect of the team performance-approach goal orientation is determined by the level of the team mastery goal orientation, which supports the multiple goal perspective (e.g., Elliot and Church 1997; Harackiewicz et al. 2002a, b).

Third, different relationships were found between team interaction and team learning outcomes. Team interaction was significantly related to increased team creativity, whereas it did not have a significant relationship with team achievement. This implies that team creativity requires frequent interactions among students to build knowledge collaboratively, but outstanding team achievement can be attained when the team shares high performance-approach goals, and frequent interactions are not essential.

Fourth, team goal orientations showed different relationships with team creativity and team achievement. Team mastery goal orientation, as expected, was positively related to team creativity (Hirst et al. 2009). Team performance-approach goal orientation exhibited positive relationships with team creativity and team achievement. These findings support previous research results that found a strong effect of performance-approach goals on achievement or performance (Elliot and Church 1997; Harackiewicz et al. 2000; Linnenbrink-Garcia et al. 2008). Moreover, the team performance-approach goal orientation was beneficial to promoting team creativity. The team performance-avoidance goal orientation had a negative but not significant relationship with any team learning outcome. In addition, a significant indirect effect of the team mastery goal orientation on team creativity was found, and this demonstrated that team interaction mediated the relationship between the team mastery goal orientation and team creativity. This supports the hypothesis that pursuing the team mastery goal orientation promotes team interaction, which in turn increases creative team learning in LCs.

Finally, the interaction effect between the team mastery goal orientation and team performance-approach goal orientation was not significantly related to either team creativity or team achievement. However, team interaction ultimately increases team creativity, and so the interaction term between the team mastery goal orientation and team performance-approach goal orientation is still important.

Conclusion

Several implications can be discussed on the basis of this study's findings. First, the results allow for an understanding of the different roles and functions of different team goal orientations in collaborative learning contexts. The most advantageous achievement goal orientation for team achievement is the team performance-approach goal orientation. To foster team creativity, both the mastery and performance-approach goal orientations are beneficial, but it should be noted that the effect of the team mastery goal orientation on team creativity is much larger than that of the team performance-approach goal orientation. Furthermore, pursuing the team mastery goal orientation has an advantage for increasing team interaction. If teams strive for mastery goals, then they exhibit frequent team interactions regardless of the level of team

performance-approach goals, whereas teams with high performance-approach goals show high team interaction only if they also have high team mastery goals; this likely affects creativity. Therefore, creative learning can be robustly predicted when teams pursue mastery goals. Finally, the team performance-avoidance goal orientation is not helpful for team learning.

Second, this study provides evidence for the multiple goal perspective. Although team goal orientations function differently in collaborative learning, as mentioned above, the findings demonstrate that having dual team goal orientations (mastery and performance-approach goals) is advantageous in team learning outcomes. In addition, the significant interaction effect between the team mastery and team performance-approach goal orientations shows that high team performance-approach goal orientation does not depress team interaction as long as the team mastery goal orientation is also high. This implies that team goal orientations are not mutually exclusive, and more research on interactive goal pattern needs to clarify the effectiveness of performance-approach goals. This may be one reason for the inconsistent results of performance-approach goals in previous studies that did not test this interactive relationship.

Third, the importance of team interaction should be highlighted in terms of team creativity. In this study, team interaction directly enhances team creativity, but it does not improve team achievement. This implies that high team achievement can be accomplished without high team interaction. Often, a division of labor with less interaction is considered an effective strategy for students. Therefore, team creativity should be explicitly emphasized as being important for collaborative learning, and even though the learning process may not seem efficient, open and active team interactions should be encouraged to enhance creative learning.

This study has a few limitations. First, because the data were gathered at a single institution, careful interpretation and generalization are required. Since it is rare to find studies that tested the achievement goal theory in collaborative learning contexts, particularly in higher education, more research on team goal orientations in a variety of collaborative learning contexts is suggested for future research. Accumulated empirical research on team goal orientations, including the present research, would contribute to the generalization of the research results. Second, the research interests and analysis of this study were at the team level. Although this study attempted to shift the analysis level from individuals to a team, future studies should approach multi-level analysis. Despite these limitations, this study has shown that the team achievement goal orientation theory is valid in the South Korean context. Furthermore, it is expected to contribute to understanding team goal orientations and promoting team creativity in LCs.

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