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Melissa J. Knott
Western New England University

D. Christopher Hayes
George Washington University

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Individual Contribution to a Team: The Importance of Continuous Adaptive Learning

Melissa J. Knott[1] and D. Christopher Kayes[2]
[1]*Management Department, College of Business, Western New England University, Springfield, Massachusetts, USA*
[2]*School of Business, The George Washington University, Washington, DC, USA*

This article develops and tests a model of continuous adaptive learning and its effects on how individuals contribute to a team in a population of undergraduate management students. We develop a measure of continuous adaptive learning, a robust measure of learning in classroom teams. We propose that continuous adaptive learning mediates the relationship between individual beliefs (both interpersonal and task related) and individual contribution to the team. We contribute to the literature on team learning in a management education setting by identifying the relationships between an individual's beliefs and behaviors about participating in a particular team and how the individual contributes to the team's outcomes. Results confirmed the validity of distinct individual beliefs and behaviors related to team learning and the relationship between individual learning behaviors and contribution to team learning, particularly the ability to help a group to excel. *Organization Management Journal*, 9: 22–33, 2012. doi: 10.1080/15416518.2012.666948

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TEAMS IN MANAGEMENT EDUCATION

Management education involves preparing students for the practice of business. Educators expect that students do more than demonstrate theoretical knowledge but also expect that students demonstrate the ability to apply this knowledge. The expectation for application of knowledge is reflected in the accreditation standards of the Association to Advance Collegiate Schools of Business (AACSB, 2008), which advocates that management education prepare students for their future careers. Among the most important skills that students can gain are team skills, as organizations have found that teams (Freeman, 1996) can address a wide variety of business needs.

The use of teams is an accepted workplace practice that has received extensive attention from researchers (Cohen & Bailey, 1997; Devine, Clayton, Philips, Dunford, & Melner, 1999; Ilgen, Hollenbeck, Johnson, & Jundt, 2005; Mathieu, Maynard, Rapp, & Gilson, 2008). In response, management educators have adopted team-related activities in the higher education classroom. Acclimating students to working in teams prepares them for future work as a member of a team in organizations (Springer, Stanne, & Donovan, 1999). The team approach to learning has become a widely accepted teaching and learning tool in management education (Barfield, 2003). Specifically, team-based learning provides students with firsthand experience of the types of team dynamics that they will experience in organizations and helps them develop skills that will contribute to their future success (Oblinger & Verville, 1998; Roebuck, 1998).

Despite the introduction of team-based experiences in management education, some of these experiences prove more productive than others. For example, some students report that others turn to the team environment to avoid doing work, the phenomenon of social loafing (Jassawalla, Sashittal, & Malshe, 2009). In our experience, students can find working in a team a positive experience that leads to learning about effective team work. Whether students report positively about their team experience or bemoan their fate as a team member, team experiences carry the potential to help students develop team skills. In either case, all too often, students are unable to capture the potential learning underneath these experiences and that learning is lost.

One way for students to understand the team experience is by participating in a team as part of an educational or learning experience and assessing the specific team outcomes desired in an organizational setting. This article offers a framework to help students understand the elements of successful team learning and identifies how such learning contributes to the team's learning outcomes. The study offers students and faculty a model to understand how individual beliefs and team learning behaviors contribute to team learning and ultimately to performance. This, in turn, helps prepare students to capture the learning that emerges from their class team experience. This individual-level, rather than group-level, focus allows for improved personal

Address correspondence to Melissa J. Knott, Western New England University, Management Department, College of Business, 1215 Wilbraham Road, Springfield, MA 01119, USA. E-mail: mknott@wne.edu

student reflection and development on the unique contribution of the individual toward team effectiveness in a particular team.

HOW INDIVIDUALS CONTRIBUTE TO TEAM LEARNING

A rich and diverse research explores how individual team members contribute to the success of the overall team. For example, Belbin's (1981, 1993) Team Role Self-Perception Inventory identifies nine roles (e.g., implementer, monitor-evaluator, completer-finisher) that team members can take. Similarly, Kline (1999) developed the Team Player Inventory (TPI) to assess individuals' preferences related to working on a team. Burch and Anderson (2004) reviewed the development of the Team Selection Inventory (TSI), an individual-level version of the Team Climate Survey (TCS). The aggregate of all team member responses to the TCS provides a baseline for the team's climate in four areas (i.e., team vision, task orientation, support for innovation, and participation safety). Stevens and Champion (1994) adopted a knowledge, skills, and abilities (KSA) framework to describe individual KSAs related to teamwork. They identified 14 distinct KSAs summarized in the dimensions of conflict resolution, collaborative problem solving, communication goal setting and performance and management, and planning and task coordination.

The team role, team player, and KSA approach offer distinct but not unrelated ways to measure how individual team members contribute to team based on team processes, team composition, fit to the team, and individual roles. Each offers insight into the relationship between an individual's preference or skill and how an each individual's preference contributes to a team in an organizational or industrial setting.

Despite benefits offered by these approaches, there remain important limitations for application of these approaches for teaching and learning in an educational setting such as management and business education. First, the demands faced by teams are distinct from those of organizations. Chen, Donahue, and Klimoski (2004) attempted to solve this problem by developing a course with both team experiences and content instructions about team. Using the Stevens and Champion (1994) KSA dimensions, Chen et al. (2004) sought to identify which KSA dimension may apply to different types of teams outside the classroom. However, Chen et al. (2004) did not address another issue: how to help individuals improve their own contributions to the team designed to perform in an educational setting that is not embedded in a course designed to instruct in team skills. Existing literature says little about the importance of learning directly from the classroom team experience, a valued process associated with educational settings. Further, existing conceptualizations focus on team-related contribution of individuals in general and do not focus on contribution to a specific team. This has the impact of sacrificing specificity of behaviors in favor of a generalized approach.

Theoretical Foundations

The research presented here provides a means to better understand how an individual contributes to team learning in a given team and the skills the person needs to improve as an individual team member within the context of management education. This study draws on team learning literature, the group level learning phenomenon discussed in organizational learning literature (see Argyris, 1993; Argyris & Schon, 1978) and its connection to the role of experience in learning (e.g., Kolb, 1984). To develop a model of individual contribution to learning in teams, we drew on a rich history of input–process–output or process models of team learning (Druskat & Kayes, 2000; Edmondson, 1999; Edmondson, Bohmer, & Pisano, 2001; Kasl, Marsick, & Dechant, 1997; Kayes, Kayes, & Kolb, 2005; Prati, Douglas, Ferris, Ammeter, & Buckley, 2003; Van den Bossche, Gijselaers, Segers, and Kirschner, 2006; Van Der Vegt and Bunderson, 2005). In this tradition beliefs are the inputs, learning behaviors are the process, and the output is performance. We drew on this literature because it describes team learning as a critical factor supporting organizational learning, making it an important concept to understand along with skills necessary for applied learning.

The use of the term *team learning* in a management education context may bring to mind cooperative learning. Cooperative learning emerges from pedagogical literature and consists of studies referencing cooperative learning (Greenbank, 2003; Hunter, 2006), collaborative learning (Greenbank, 2003), collective learning (Hunter, 2006), peer learning (Greenbank, 2003; Hunter, 2006), reciprocal learning (Hunter, 2006), and team learning (Hunter, 2006). Generally, cooperative learning describes "students work[ing] jointly in small groups to accomplish an educational task" (Gupta, 2004, p. 63) or, more specifically, as "students working in mixed-ability groups on clearly defined tasks with the expectations that they will be rewarded on the basis of group success" (Hancock, 2004, p. 159). Cooperative learning has been incorporated into many different activities. Activities may include studying, reviewing material in and out of class, written assignments, presentations, and performances (Barfield, 2003; Springer et al., 1999). This pedagogical focus (see Michaelsen, Bauman-Knight, & Fink, 2002) helps us understand how to maximize individual learning of content through design and practice. It also provides a vehicle for a team experience that is of interest here. It is this team experience and the team learning skills transferable to the workplace that students will obtain by better understanding their team experience with the use of this framework.

An additional reason for using this literature is that the group process perspective of team learning is consistent with a field study approach and seeks to understand the inner workings of the team (Edmondson, Dillon, & Roloff, 2007). Thus, the model considers only those beliefs and team learning behaviors that an individual member can influence—what we call the sphere of individual contribution—and does not include other

factors such as organizational context (e.g., Edmondson, 1999) where an individual has less influence. Third, a process-oriented model provides a comprehensive framework for team functioning (see Hackman, 1987) and for integrated beliefs and team learning behaviors that cover both the cognitive and behavioral elements of the team process, allowing for a more fine-grained understanding of the team experience (see Druskat & Kayes, 2000).

Individual Contribution to Team Learning

The foundational theory of this research is based on the notions that the individual is situated in the context of a team and that learning occurs first in the individual and then is transferred to the team (see Kayes et al., 2005). This view of how individuals contribute to team learning is consistent with thinking in organizational learning literature, which has a rich heritage of acknowledging the role of the individual in the group and organization context (Argyris & Schon, 1978), such that organizational learning is valued in the workplace.

More specifically, the relationship between the individual members and the team in the team learning contexts arises in four stages: First, individual learning occurs. Second, individual learning is transformed into functional learning, which, third, translates individual learning into whole team learning. Finally, team learning is communicated throughout the team (Barker and Neailey, 1999; Kasl et al., 1997). This describes team learning as a process that begins with individual learning, which is translated into team interaction, and ultimately becomes incorporated into the team as a whole. This framework seeks to help students understand their own experience in team learning.

Continuous Adaptive Learning

Learning behaviors are the process element of the input–process–output model, as they are considered the social interactions among group members that lead to specific, desired outcomes (Van den Bossche et al., 2006). They are team activities that allow the team to adapt and improve as members obtain and process data (Edmondson, 1999). This is not the sum of individual activities or individual knowledge. It is a social process where one person's contribution is presumed to build upon another's in a manner described as the coconstruction of meaning (Van den Bossche et al., 2006). The behaviors are characterized by their focus directly on the processes used by the team to complete work.

One limitation of previous conceptualizations is the focus on only one aspect of team learning behaviors. We intentionally considered learning in teams as a more robust construct that involved two activities adapting to changing situations and continuous improvement. Adapting is responding to unexpected internal and external demands resulting from problems and roadblocks. It is demonstrated by adjusting actions and beliefs, particularly in uncertain situations. By openly recognizing and discussing these demands, members can surface a potential collective response (Edmondson, 1999). Continuous improvement describes working together, incrementally improving the team's ability to learn and respond to ongoing and routine challenges by sharing information and avoiding mistakes. The emphasis on the routine, incremental nature of these changes distinguishes continuous improvement from adapting. While adaptation focuses on the team's response to the unexpected, continuous improvement speaks to the team member's ability to make incremental improvements to processes and procedures so that mistakes are avoided. Both address how team members facilitate change incrementally (continuous improvement) and in response to the unexpected (adapting).

Kayes and Kayes (2011) suggest that individual beliefs and behaviors form the core of team learning. Beliefs, similar to norms, serve as basic inputs, and team learning behaviors form the process element of teamwork. We hypothesize that individuals contribute to learning in a more robust manner than conceptualized by prior research. We suggest a construct that describes the degree to which the team members reviewed the work accomplished, suggested and took corrective action, and helped other team members to improve routine processes or in response to unexpected demands. We call this construct continuous adaptive learning.

Hypothesis 1: Continuous adaptive learning is distinct from individual beliefs about team learning.

Individual Beliefs About Team Learning

Beliefs provide the social context necessary for learning behavior to take place (Van den Bossche et al., 2006), reflect the notion that learning is a localized, interpersonal process, and establish a social climate under which learning can take place (Edmondson, 2003). Research and theory suggest a division between two types of underlying team beliefs. This division is similar to Benne and Sheats's (1948) early work on groups in which they identified two dimensions to team success: task and interpersonal dimensions. Similarly, Feldman (1984) described these two dimensions (task and social) as two sets of independent norms that operate within a team to make it function. Categorizing the beliefs in this way acknowledges the distinction between task and interpersonal and provides clarity for students using the model.

The belief about team learning task dimension is team confidence. Team confidence describes the belief that a team member can accomplish the task they face (Bandura, 1982). Pescosolido (2003) found that team confidence increased project grades and members' willingness to continue with the team. Research also shows confidence to be positively related to learning behaviors (Edmondson, 1999; Gibson, 1999; Van den Bossche et al., 2006), although the results are often mixed when controlling for team psychological safety (Edmondson, 1999).

Interpersonal understanding is the interpersonal belief about team learning dimension. Interpersonal understanding describes a team member's recognition and comprehension of the

emotional states, preferences, or relationships of individuals in the group. Druskat and Wolff (2001) identified three levels of emotional intelligence: individual, group, and cross-boundary. Group emotional intelligence occurs when members of the group pay attention to other members' emotions. High group emotional intelligence can be built when one member takes pains to consider matters from another member's perspective. Awareness of other members' emotions creates the environment in which action can be taken to positively address the emotional states of other members. Allowing individual members in a group to influence the emotional state of other team members has been called emotional contagion (Barsade, 2002). Positive emotional contagion can increase the positive group mood, and positive group mood can lead to greater group cooperation. Druskat and Kayes (1999) found that interpersonal understanding positively predicted team learning behaviors in MBA (master's degree in business administration) students.

Hypothesis 2: Interpersonal understanding is positively related to individual behaviors that contribute to team learning.

Hypothesis 3: Confidence that the team can perform is positively related to individual learning behaviors in a team.

Individual Belief, Contribution to Team Learning, and Team Effectiveness

A recent meta-analysis has shown that team processes have a positive relationship with team performance (Le Pine, Piccolo, Jackson, Mathieu, & Saul, 2009). We also considered the relationships among learning beliefs, continuous adaptive learning, and individual contribution to team performance. Mathieu, Goodwin, Heffner, Salas, and Cannon-Bowers (2000) found that group processes (i.e., cooperation) fully mediated the relationship between mental models (organized knowledge structures that help make decisions) and team outcomes. These relationships are expected to hold in an educational setting as well.

Hypothesis 4: Continuous adaptive learning will be positively related to individual contribution to the team.

Hypothesis 5: Continuous adaptive learning will mediate the relationship between beliefs and individual contribution to the team.

The hypothesized relationships are presented in Figure 1.

METHODS

Sample

This study was part of a comprehensive, multiyear, multisite sample study designed to better understand how individuals contribution to team learning in educational settings. For this study, we surveyed a sample of undergraduate business students enrolled in one of two courses with semester-long teams (14 weeks) at the business school of a mid-Atlantic university. The courses consisted of a weekly lecture and a lab/discussion session. Student teams interacted during labs and were responsible for completing a semester-long project, resulting in a paper and presentation, and for smaller deliverables during the semester. Team members were randomly assigned by the instructor and teams ranged in size from three to five members (mean = 4.24; $SD = .96$). Teams were considered self-directed in that no leader was assigned. A total of 201 students participated. The sample size satisfied the minimum of 150 suggested by Guadagnoli and Velicer (1988) to be adequate when conducting exploratory factor analysis. Descriptive statistics are listed in Table 1.

These student teams hold characteristics of work teams because they were an "interdependent collection of individuals who share responsibilities for specific outcomes" (Sundstrom, De Meuse, & Futrell, 1990, p. 121). The team members were jointly responsible for specific deliverables to the instructor. Some of these teams may have integrated their work to greater or lesser degrees. Team members received the same grade for the deliverables in an attempt to ensure joint responsibility.

Measures

Individual Beliefs and Behaviors About a Team

We developed a survey to measure an individual team member's self-perception of beliefs and team learning behaviors within a specific team. Response set for each item was on a 7-point Likert scale ranging from *very accurate* to *very inaccurate*. A description was provided for each point on the measure to enhance participant interpretation of the scale (Weng, 2009). A 7-point scale was selected to improve reliability over a scale with fewer points, and the study population, college students, should be able to distinguish among the scale items (Weng, 2004). The survey was developed, pretested, revised,

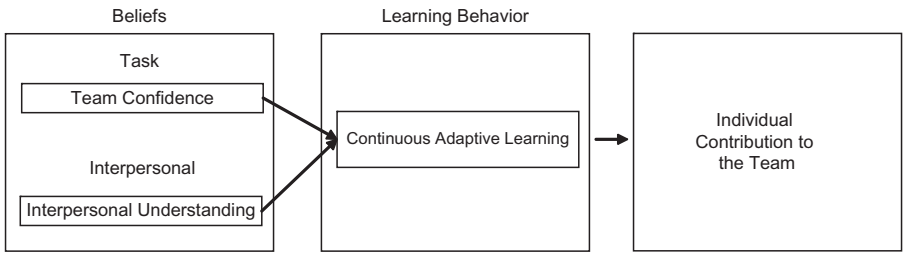

FIG. 1. Individual contribution to team learning.

TABLE 1
Descriptive statistics

Descriptor	Total	Percentage
Gender		
Male	99	49.3
Female	95	47.3
Not reported	7	3.5
Ethnicity		
African American	7	3.5
Asian	26	12.9
East Indian	4	2
Native American	0	0
Caucasian	130	64.7
Middle Eastern	3	1.5
Hispanic	7	3.5
Pacific Islander	0	0
Other	12	6
Not reported	12	6
Age (years)		
17	15	7.5
18	128	63.7
19	21	10.4
20	8	4
21	4	2
Not reported	25	12.4

and retested guided by these assumptions. First, we created a list of items and administered them to a test group. The items were then revised, dropped, or added based on analysis. Remaining items were presented to a group of 14 subject-matter experts (SMEs), who included management professors and advanced doctoral students, using a card sort method, and these SMEs reviewed the items to assess content validity. In addition, comments from SMEs noted on the cards were recorded on a matrix organized by construct. Review of the calculated percentage agreement reflected natural cut points, which were used to establish the degree of agreement criteria. Review of the results from the card sort and reviewer comments led to a second round of revisions and deletions. Final items and factor loadings are listed in Table 2.

Contribution to the Team

Because the focus of the study was on individual contribution to team performance, performance outside of the team context is not of interests here; therefore, individual work would not suffice. The individual work was not discernable within the team's deliverable, as the work required collaboration rather than additive work. Students were asked to evaluate each of their peers to measure team performance, and we used a modified version of Baker's (2008) peer evaluation short form. It has shown interrater reliability of .80, and correlation with quiz scores was .41 ($p < .001$). Individuals received one score for each of four areas (preparation, participation and communication, helps other team members excel, and being a team player) from each team member. These four scores were aggregated across all team members' ratings, resulting in a single score for each individual. Individuals had to be evaluated by a minimum of two team members to be included in the analysis. More than 80% of study participants were evaluated by all four of their team members. In order to limit same source bias, we collected surveys for contribution to the team at a separate point in time; however, this lowered our response rate for the overall sample to 158.

RESULTS

Exploratory factor analysis with Varimax rotation was conducted because, although there was some knowledge about the relationships being measured, this is the first time these specific items have been tested. Items for each construct were included if the factor loading was greater than .50 on one factor and less than .37 on a second factor. The lower bound of .37 was selected based on critical values of correlation coefficients with a sample size of 201 (Stevens, 2002). The rotation converged after 22 iterations. The three factors in the study accounted for 36% of the variance. The coefficient alpha values (Cronbach, 1951) of the constructs were acceptable, as they were for continuous adaptive learning.88, team confidence.90, and interpersonal understanding.81. These results supported Hypothesis 1 that continuous adaptive learning was a distinct construction, as items related to learning converged and those items not associated with learning were distinct.

Hypotheses 2 and 3 suggested a positive relationship between interpersonal understanding, team confidence, and continuous adaptive learning. These relationships were tested using hierarchical linear regressions. Significance level was set at $p < .05$. Analysis was conducted with demographic variables to ensure the robustness of the model. Table 3 shows the results of the regression model where continuous adaptive learning is the dependent variable. The control variables, ethnicity and gender, were entered in the first step for all models. The second and third steps included entering the independent variables, interpersonal understanding, and team confidence.

The main effects of interpersonal understanding ($\beta = .37$, $p < .01$, $R^2 = .14$, $\Delta R^2 = .13$) and team confidence ($\beta = .44$, $p < .01$, $R^2 = .20$, $\Delta R^2 = .19$) were both positive and accounted for significant incremental variance in continuous adaptive learning beyond what was accounted for by the control variables. Team confidence accounted for more variance than did interpersonal understanding. Model 3 including both independent variables was also significant ($\beta = .28$, $p < .01$, $R^2 = .27$, $\Delta R^2 = .26$). Overall, Hypotheses 2 and 3 were supported, as both interpersonal understanding and team confidence contributed independently to continuous adaptive learning.

Table 4 shows the results of the regression models, testing Hypothesis 4, with individual contribution to team performance

TABLE 2
Study items and results of factor analysis ($N = 201$)

Item—intended measure	Factors		
	Continuous adaptive learning	Team confidence	Interpersonal understanding
Suggest ways for the team to improve—continuous improvement	**.76**	.18	.06
Discuss how the team should respond to team setbacks when they occur—adapting	**.72**	.20	.15
Regularly review how the team accomplishes work—continuous improvement	**.63**	.27	.12
Suggest improvement to team processes and procedures—continuous improvement	**.62**	.10	.11
Take corrective action when my team faces an unexpected problem—adapting	**.60**	.07	.14
Know what to do if something unusual goes wrong—adapting	**.60**	.33	.26
Correct possible mistakes before they happen—continuous improvement	**.56**	.22	.22
Help the team with unexpected team issues—adapting	**.54**	.16	.07
Step in when other team members encounter an unexpected problem—adapting	**.52**	.07	.13
Am confident that my team will perform well—team confidence	.08	**.86**	.05
Believe that my team will be successful—team confidence	.19	**.83**	.04
Believe that my team will perform better than other teams—team confidence	.20	**.79**	.11
Know that my team can accomplish anything—team confidence	.14	**.78**	.10
Believe that my team can solve any issues it faces—team confidence	.21	**.74**	.13
Know when a team member is having a bad day—interpersonal understanding	.05	.07	**.83**
Know when other team members are under stress—interpersonal understanding	.16	.11	**.78**
Recognize when a team member is in a bad mood—interpersonal understanding	.07	.08	**.78**
Am aware of the feelings and moods of team members during meetings—interpersonal understanding	.28	.03	**.63**
Eigenvalues	11.66	2.98	2.72
Percent of variance	24.31	6.20	5.68
α	.88	.90	.81

Note. Factor loadings meeting acceptable standard are in bold.

as the dependent variable and continuous adaptive learning as the independent variable. In all, four models were tested. The control variables, ethnicity and gender, were entered in the first step for all models. The second step included one or all of the beliefs and continuous adaptive learning as independent variables. In the first model, the independent variable was interpersonal understanding; in the second, team confidence; and in the third, continuous adaptive learning. The fourth model included all three of the independent variables. The main effects of interpersonal understanding ($\beta = .12$, $p = .15$, $R^2 = .07$, $\Delta R^2 = .01$) and team confidence ($\beta = .10$, $p = .16$, $R^2 = .08$, $\Delta R^2 = .01$) show neither was significant, indicating that neither of the beliefs provided incremental variance in individual contribution to team performance beyond that accounted for by the control variables. The effects of two beliefs and continuous adaptive learning (model 4) were also not significant ($\beta = .16$, $p = .09$, $R^2 = .09$, $\Delta R^2 = .04$). The main effect of continuous adaptive learning in model 3 showed mixed results: The model ($R^2 = .09$, $p = .07$) was not significant, while continuous adaptive learning ($\beta = .19$, $p < .05$, $\Delta R^2 = .04$) was independently significant, providing support for incremental variance in individual contribution to team performance beyond that accounted for by the control variable.

It was anticipated that individual performance would be associated with beliefs and team learning behaviors. The individual contribution to team performance measure is an aggregate of four areas of individual performance: (1) preparation, (2) participation and communication, (3) ability to help the

TABLE 3
Regression model of continuous adaptive learning ($N = 192$)

	Model 1					Model 2					Model 3				
Variable	*B*	*SE B*	β	R^2	ΔR^2	*B*	*SE B*	β	R^2	ΔR^2	*B*	*SE B*	β	R^2	ΔR^2
Step 1				.01					.01					.01	
(Constant)	5.71	.09				5.7	.09				5.72	.09			
Control variables															
Ethnicity	.13	.26	.04			.13	.26	.04			.13	.26	.04		
Gender	−.06	.12	−.04			−.06	.12	−.04			−.06	.12	−.04		
Step 2				.14**	.13**				.20**	.19**				.27**	.26**
Interpersonal understanding	.30	.06	.37**								.29	.05	.38**		
Team confidence						.34	.05	.44**			.22	.05	.28**		

Note. *B*, unstandardized coefficient; *SE B*, standard error of the unstandardized coefficient; β, beta, standardized coefficient; R^2, *R*-squared; ΔR^2, change in *R*-squared.
*Significant at the .05 level. **Significant at the .01 level.

TABLE 4
Regression model of performance ($N = 158$)

	Model 1					Model 2					Model 3					Model 4				
Variable	*B*	*SE B*	β	R^2	ΔR^2	*B*	*SE B*	β	R^2	ΔR^2	*B*	*SE B*	β	R^2	ΔR^2	*B*	*SE B*	β	R^2	ΔR^2
Step 1				.05	.05				.05	.05				.05	.05				.05	.05
Control variables																				
Step 2				.07	.01				.07	.01				.09	0.04*				.09	.04
Interpersonal understanding	.07	.05	.12													.03	.05	.05		
Team confidence						.07	.05	.12								.02	.06	.03		
Continuous adaptive learning											.14	.06	.19*			.12	.07	.16		

Note. *B*, unstandardized coefficient; *SE B*, standard error of the unstandardized coefficient; β, beta, standardized coefficient; R^2, *R*-squared; ΔR^2, change in *R*-squared.
*Significant at the .05 level. **Significant at the .01 level.

group excel, and (4) being a team player. We then conducted regression analysis with each of the four performance areas as the dependent variable, as shown in Table 5. The control variables of ethnicity and gender were entered in the first step for all analyses. In the second step, continuous adaptive learning was entered as the independent variable. The main effects of continuous adaptive learning on "being a team player" ($\beta = .12$, $p = .13$, $R^2 = .07$, $\Delta R^2 = .01$) and "preparation" ($\beta = .16$, $p = .05$, $R^2 = .08$, $\Delta R^2 = .02$) both failed to reach significance. "Preparation," however, was just at the cutoff for significance of $p < .05$. The main effect of continuous adaptive learning on "ability to help the group excel" ($\beta = .22$, $p < .05$, $R^2 = .12$, $\Delta R^2 = .05$) was significant, accounting for significant incremental variance in the "ability to help the group excel" performance area beyond that accounted for by the control variables. Results were mixed for the dependent variable of "participation and communication." The model ($R^2 = .09$, $p = .09$) was not significant. However, continuous adaptive learning independently ($\beta = .21$, $p < .01$) and the change in R^2 ($\Delta R^2 = .04$, $p < .01$) were both significant, indicating an independent relationship between continuous adaptive learning and the performance area of "participation and communication." Thus, Hypothesis 4 was also partially supported, as continuous adaptive learning predicted specific aspects of individual contribution to team performance, but not to it overall.

Hypothesis 5 suggested that team learning behaviors mediated the relationship between beliefs and performance. There are four steps included in the procedures suggested by Baron and Kenny (1986) to test for mediation. The first step requires verification that a relationship exists between the hypothesized constructs. In this case that relationship is between team learning beliefs and individual contribution to team performance. Thus, Hypothesis 5 was not supported.

DISCUSSION

The purpose of this study was to develop and test a model for assessing how an individual contributes to a team's overall success in an education setting and, specifically, how an individual's beliefs and team learning behavior contribute to team performance in management education. Although the results related to performance were mixed, the team learning behavior, continuous adaptive learning, was found to be distinct from the individuals' beliefs: interpersonal understanding and team confidence. Students and instructors can benefits from these distinctions.

Instructors can address each of these distinct elements separately and influence them through course design. Rather than assigning a single complex project for teams, instructors may be able to facilitate confidence in the team's ability by providing smaller, less complicated assignments prior to the final project. By acknowledging the potential for interpersonal dynamics in student teams, instructors can assign or help students self-select into teams to minimize these dynamics (e.g., group by geographic location to facilitate meeting outside of class). Multiple assignments also require students to consistently work together, providing an opportunity for students to know one another better such that they may be more understanding of other team members. Instructors can also check in with teams, requesting anonymous feedback about interpersonal understanding and team confidence. This serves two purposes. First, students will take the time to become more self-aware and potentially self-correct. It will also provide instructor awareness such that coaching can occur.

Continuous adaptive learning consisting of both adaptive and continuous improvement behaviors can also be influenced by the instructor. In an educational setting, students may be developing adapting and continuous improvement behavior in an effort to correct immediate concerns brought on by instructor imposed deadlines and grades. Instructors can assist student teams by providing detailed instruction, thus avoiding unnecessary setbacks. Multiple smaller assignments, as discussed earlier, related to team confidence, may also assist student teams. Multiple deadlines and projects create an environment where team members can develop and improve their behavior over time.

Students also benefit from understanding these distinctions. Through self-awareness, students can be intentional about how they treat and cooperate with other members to ensure interpersonal understanding. As suggested earlier, one way this may be accomplished is through team selection. In addition, by encouraging and supporting other team members, those members' confidence will increase. The intentional increase of team members' confidence and interpersonal understanding will positively impact the team's continuous adaptive learning. This knowledge can be applied to any classroom team regardless of the subject and is transferable to teams outside the classroom. With each successive team experience in the education environment, students can learn and practice effective ways of positively impacting the teams learning.

Team confidence and interpersonal understanding predicted continuous adaptive learning. Although these beliefs were not related to an individual's overall contribution, both confidence in the team's ability to perform and interpersonal understanding were directly related to the contribution to team learning. Individual continuous adaptive learning was shown to contribute to the individual's ability to help the group excel. This is not surprising, as continuous adaptive learning incorporates adaptive and continuous improvement behaviors that are enacted by suggesting improvements and helping team members, characteristics of the performance measure "ability to help group excel."

Limitations

There are a number of limitations to this study. The first relates to the sample. The sample of 201 students met the

TABLE 5
Regression model of each performance area ($N = 158$)

	DV: Being a team player					DV: Ability to help group excel					DV: Participation and communication					DV: Preparation				
Variable	*B*	*SE B*	β	R^2	ΔR^2	*B*	*SE B*	β	R^2	ΔR^2	*B*	*SE B*	β	R^2	ΔR^2	*B*	*SE B*	β	R^2	ΔR^2
Step 1				.06	.06				.07	.07				.04	.04				.05	.05
(Constant)	3.58	.064				3.47	.08				3.50	.07				3.50	.073			
Control variables																				
Ethnicity	.13	.19	.05			.15	.24	.05			.05	.22	.02			−.03	.22	−.01		
Gender	.12	.09	.11			.20	.11	.14			.10	.10	.08			.14	.10	.11		
Step 2				.07	.01				.12*	.05**				.09	.04**				.08	.02
Continuous adaptive learning	.08	.06	.12			.19	.07	.22**			.17	.06	.21**			.13	.06	.16		

Note. DV, dependent variable; *B*, unstandardized coefficient; *SE B*, standard error of the unstandardized coefficient; β, beta, standardized coefficient; R^2, *R*-squared; ΔR^2, change in *R*-squared.

*Significant at the .05 level. **Significant at the .01 level.

sample size required for exploratory factor analysis suggested by Guadagnoli and Velicer (1988). The sample used in this study was from one university and business school, so the sample may not take into account difference between institutions. In the same way, the inclusion of students from only two classes limits the range of team types and task types that were included. Differences in task structure may constrain team creativity. The extent to which the model and the measure will hold in similar teams outside of the classroom setting remains to be seen. Both are expected to be applicable to other adult learners.

In addition, the design of the study also presents limitations. The cross-sectional survey design of the study does not allow any conclusions to be made about causality, nor does it consider changes that may occur over time. That is to say, beliefs and team learning behaviors may be different at different points in time as a result of changes to individual members, the team as a whole, or the environment in which the team operates. Self-report measures are inherently problematic (Podsakoff & Organ, 1986). The measure developed for this study is no different. The constructs in the study were each measured through one self-report measure, creating the opportunity for common method variance problems.

CONCLUSION

A better understanding of the team learning process in management education student teams provides a number of opportunities for faculty and for future research. Specific developmental activities for classroom use can be developed and tested to assist faculty teach team learning principles and to help students experience the team learning process.

Further research to test the model and measure with different team contexts and characteristics is needed. Future research might include observational rather than or in addition to self-report measures. In terms of the role of individual perceptions of team learning and its relationship to outcomes, future research should seek a more robust measure of contribution to learning, again perhaps utilizing more observational measures or more objective measures such as improvement on tasks over time. Also, future research should seek to better understand how individual perceptions of team learning develop over time.

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ABOUT THE AUTHORS

Melissa J. Knott, PhD, is Assistant Professor of Management at Western New England University in Springfield, Massachusetts. She earned a PhD in management at The George Washington University. She teaches courses at the undergraduate and graduate levels in organizational behavior, interpersonal skills, leadership, conflict, human resource management, and leadership. Her research interests include team learning, learning in the classroom, and team dynamics in the workplace and classroom. She is the recipient of the OBTS Teaching Society for Management Educators New Educator award for 2012.

D. Christopher Kayes, PhD, is Professor of Management at The George Washington University in Washington, DC. His research on learning and the destructive pursuit of goals received the first Most Significant Contribution to the Practice of Management award by a division of the Academy of Management. His analysis of the 1996 Mt. Everest climbing disaster also won a best paper award. He is author or co-author of four current and forthcoming books including *Destructive Goal Pursuit*, *The Learning Advantage: Six Practices of Learning Directed Leaders*, and *The Breakdown and Rebuilding of Learning in Organizations*.