A model for developing and assessing students' teamwork competencies

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ABSTRACT

This article focuses on the challenges of developing and assessing students' teamwork skills and presents a model for evaluative, developmental, and outcome assessment purposes. The characteristics of student teams in educational settings are identified and contrasted with those of work teams. Based on a review of the literature, teamwork skills that are transportable and valued in the workplace are identified and team learning goals are developed for use in higher education. The article presents a four-phased integrative approach for developing and assessing students' teamwork skills and provides instruments for use at various stages of the learning process.

Keywords: student teams, assessment, teamwork skills, team leadership skills, higher education

INTRODUCTION

Teams of all types have become a popular tool of contemporary management in organizations of all types and sizes and it is believed that team structures will increasingly be adopted by organizations of the future (Guzzo, 1995). Teams have been lauded for improving the quality of decision making (Kerr & Tindale, 2004), for fostering innovation and creativity (Larson & LaFasto, 1989), and for enhancing organizational learning (Edmonson, Dillon, & Roloff, 2008) among many other benefits. Recognizing that organizational structures are getting flatter, influential authors in the field of management have heralded teams as the new system of management (Senge, 1990; Katzenbach & Smith, 1993) or as the very essence of leadership. For example, Wageman, Nunes, Burruss and Hackman (2008, p. 1) referred to this evolving trend in management as the "fall of the single heroic CEO and the rise of the leadership team."

It is thus not surprising that organizations and employers are increasingly seeking college graduates who are well-prepared in teamwork knowledge, skills, and abilities (Hillier & Dunn-Jensen, 2012; Galbraith & Webb, 2013; Hobson, *et al.*, 2014; Lovelace, Eggers & Dyck, 2016). Colleges and universities are responding to these demands by providing opportunities for their students to work in team projects and engage in collaborative learning (Halfhill & Nielsen, 2007; Albon & Jewels, 2014). For example, AACSB International - The Association to Advance Collegiate Schools of Business, the accrediting agency for business programs, emphasizes interpersonal skills and teamwork (AACSB, 2013, p. 32). In addition to the expectation that programs develop collaborative learning goals, accrediting agencies require the assessment of the adopted goals.

While teams bring many benefits to an organization and to its members, it is also evident that ineffective teamwork can lead to disastrous decisions, cause costly delays, and bring a lot of grief and frustration to its members (Hackman, 1990; Lencioni, 2002). Despite the growing emphasis on developing teamwork competencies of students in higher education, recent studies raise major questions about the effectiveness of most of these curricular initiatives (Chen, Donahue, & Klimoski, 2004; Hansen, 2006; Willcoxson, 2006). Instructors and program coordinators often lack a cohesive model of teamwork, use varying guidelines, or employ assessment methodologies loosely grounded on solid theories (Baker, 2008; Friedman, Cox, & Maher, 2008).

The literature on teams can be organized around three main areas of research: Social psychology, management, and education. Social psychologists have long used solid methodologies to study the behavior of individuals in small groups (for clear and comprehensive reviews of the literature see, for example, Guzzo & Dickson, 1996; and Kerr & Tinsdale, 2004). The importance of teams in the workplace has been recognized in the management literature and there is a growing body of research on what it takes to make teams successful (*e.g.*, Hackman, 1990; LaFasto & Larson, 1989, 2001; Wageman *et al.*, 2008). The third stream of research pertains to teams in education and training and the challenges it poses to both students and educators (*e.g.*, Salas, Burke, & Cannon-Bowers, 2002; Forrester & Tashchian, 2006; Halfhill & Nielsen, 2007; Opdecam, *et al.*, 2014). Each area of research on teams presents different but complementary and insightful perspectives.

The remainder of the article is organized as follows: First the nature of teamwork and different types of teams are examined, and student teams are compared and contrasted with work teams, highlighting the unique characteristics of classroom teams. Next, ten teamwork skill sets that are valued in the workplace are identified and five learning goals are proposed for use in

higher education. The next section details a model for developing and assessing students' teamwork skills, including four instruments designed to be used for different assessment purposes. A brief discussion concludes the article in the final section.

WORK TEAMS AND CLASSROOM TEAMS

When studying work teams, two concepts are particularly significant for the understanding of team processes and team skills: (a) the level of authority and autonomy of a team, and (b) the type of task interdependence. In terms of different levels of authority and autonomy, manager-led teams do not have authority beyond that of carrying out the work. The goals of self-managed teams are determined by the organization but the team has the autonomy to decide and monitor the methods by which to achieve the goals. Self-directing or self-designing teams have considerable autonomy in setting their own objectives and managing work processes but lack the authority and the means to control the team's organizational context and its performance criteria. Finally, self-governing teams have authority to set their goals and objectives, and the methods to achieve them, and have considerable influence in shaping the performance criteria and the resources available to the team (Hackman, 1987). As for task interdependence, Steiner (1972) studied the relationship between the tasks performed by the team members and the group output. He considered three main types of interdependence of tasks: additive, conjunctive, and disjunctive. With additive tasks, the group output is defined as the sum of the outputs of its members; with conjunctive tasks, the group task cannot be achieved unless all team members do their parts, and the team performance is determined by the least effective member; lastly, with disjunctive tasks, the team's task is often determined by one or few members and the level of excellence of the group's output is defined by the maximum performance in one or few critical tasks. Some teams are defined by one dominant type of task while others are responsible for team outcomes that have mixed task interdependences. For example, a cleaning crew is dominated by additive tasks, assembly line workers are dependent on the slowest performer (conjunctive tasks), and the success of a research team is dependent on its brightest or most creative member (disjunctive tasks); the success or failure of a surgery team, however, has a mixed task interdependence. From the higher education and professional training perspectives, a clear understanding of team autonomy and task interdependence will help educators to realize the scope and variety of teamwork skills needed to succeed in different team contexts.

When studying the factors that impact team effectiveness, the emphasis of earlier studies was on process losses. For example, an increase in the size of a team beyond a certain level will generally lead to a reduction in its productivity (Steiner, 1972). Similarly, deficient communication among the team members, lack of trust or lack of group cohesiveness, and many other factors, will explain at least in part why a team is not performing optimally (Guzzo & Dickson, 1996). Steiner (*Ibid*, p. 9) presented this view eloquently with a simple equation: *Actual productivity = potential productivity – losses due to faulty processes*. A positive view of teamwork is reflected in the general model proposed by Hackman (2002, p. 236): *Actual productivity = potential productivity – process losses + process gains*. According to the above equation, team productivity is influenced by the reduction of process losses as well as by the strengthening of process gains. One of the most interesting aspects of this model is that the initial individual potential of a team member may increase due to positive group dynamics. For example, process gains may be the result of members sharing specific information and

knowledge, praising others for their good work, instructing and encouraging others to do better, facilitating communication among different parties, and building trust so that members feel comfortable in developing their skills (Guzzo & Dickson, 1996; Horwitz, 2005; Morgeson, Reifer & Campion, 2005; Hillier & Dunn-Jensen, 2012).

Consistent with Campion *et al*. (1996), a strong initial setup is critical to the success of a team; this includes a clear goal and members who are competent and committed (Larson & LaFasto, 1989). However, team members who possess good teamwork skills are necessary but not sufficient for effective teamwork, as team processes are greatly influenced by positive and negative group dynamics, and the continued monitoring and support of a team by the organization is critical to its success (Hackman, 1987, 2002). Team and individual coaching, facilitating, and leadership development, and the nurturing of ties between the team and its external networks (*e.g*., to increase the team's ability to get external resources; Ancona & Caldwell, 1992) are processes that cannot be overlooked. Among these relationships, external interventions and team coaching are indispensable. Wageman and Donnenfeld's (2007) propose the four types of team interventions: (i) team redesign (*i.e*., changes in the structure in which teams do their work, goals, team membership, the nature and amount of resources allocated to the team, team rewards, and norms of conduct), (ii) team process coaching (*i.e*., coaching that is directed at improving motivation, communication, and strategy), (iii) conflict resolution (*i.e*., intervention directed at improving the quality of conflict, including trust-building exercises, structured debates, appointing a devil's advocate), and (iv) changing the individual (*i.e*., behavioral training directed at specific members with the goal of making them more tolerant, thoughtful, and capable of working with others). Timely and focused interventions are essential in order to prevent or correct dysfunctional processes in a team. Combining the contributions of the studies discussed above, Figure 1 presents four core components that are essential for achieving effective outcomes: (a) initial team setup, (b) team processes, (c) organizational support, and (d) social support.

Work teams and classroom teams can be best differentiated by contrasting the purpose for which they are formed. For an employer who is putting together a work team, an initial issue is whether a particular individual will be effective in helping the team to fulfill its assignment. Once the team is in place, a major concern is to assure that team members work effectively and that any problems are timely addressed. For the educator, on the other hand, the main focus is how to impart the importance of teamwork, develop the student skills, provide helpful feedback to students and assess their performance and skill development. Still for the program director, the most acute need is to determine if a program that was designed to develop teamwork skills is meeting its collaborative learning outcomes. We will explore these issues from a decidedly individualistic, student-learning perspective and propose a temporal model based on the specific nature and characteristics of classroom-based teams.

With the increased emphasis on student's soft-skills development, the learning goals for student teams are often twofold: (a) acquisition or application of knowledge of a particular subject matter, and (b) the learning of how to work in teams. Except in the cases where specific courses are targeted to develop the students' teamwork skills (*e.g*., an advanced organizational behavior course), teamwork learning goals are generally subordinate to discipline specific goals (*e.g*., statistics course). In many instances, students work in teams without specific teamwork learning goals (e.g., students working in a lab) and the instructors do not necessarily have an expertise in team processes and teamwork skills beyond a rudimentary level (Chen *et al*., 2004;

Varela, Burke & Michel, 2013). This is often due to the use of teams in higher education for a variety of reasons and without careful design of the team tasks by the instructor (Hansen, 2006).

There are many challenges for classroom teams as shown in Figure 1. The task of working with classroom-based teams is made more challenging in that most students have only a sketchy notion of the competencies that facilitate teamwork, and because the incentives to perform well are often weak or unclear (Friedman *et al.*, 2008). For example, students are acutely aware of teammates who shirk their responsibilities, but are often unable to diagnose a team process or propose ways to improve it. As noted by Halfhill and Nielsen (2007, p. 65), students do not always appreciate the importance of developing interpersonal skills until later in their careers. Student teams often experience problems because of uneven effort, different abilities, and level of participation of their team members in contributing to the task and to the group (Feichtner & Davis, 1985; Gueldenzoph & May, 2002). In addition, many students have negative feelings of team assignments because of their past experience with dysfunctional teams and free riding problems (Mello, 1993; Jassawalla, Sashittal, & Malshe, 2009). In addition to the areas of concern identified above, many of the challenges that student teams face result from fundamental differences between work and student teams:

1. Purpose - While the purpose of work teams is the successful attainment of an external common outcome, (e.g., meet a sales target or design a new product), the purpose of student teams is to achieve individual learning outcomes (e.g., learn course content, improve interpersonal skills);
2. Autonomy and task interdependence – While most student teams are self-managed, students rarely experience self-directing or self-governing team situations in the classroom. In terms of task interdependence, team assignments often are additive; conjunctive and disjunctive tasks rarely characterize typical student team assignments;
3. Member roles - The division of labor among equal members of a class is largely arbitrary and is not generally based on the specific knowledge, experience, or relationships that members bring to the team; there is limited role differentiation, and when clear roles are assigned, they are often not based on the students' specific knowledge, skills or abilities;
4. Teamwork skills - Team members are not expected to be proficient in specific teamwork skills or bring to the team a particular mix of skills that will help the team perform effectively; rather, students come with rudimentary teamwork skills and the role of the instructor is to help them develop their skills;
5. Leadership - Team leaders are not generally assigned to student groups, and even if a leader emerges no significant authority, power, and rewards are bestowed on the leader;
6. Organizational support - Communication with the instructor is not generally restricted to the team leader, and typically information and material resources are available to all members on an equal basis;
7. Linkages - A student's performance in the team is not linked to future assignments in other courses. In work teams, performance in a team assignment can have major ramifications for future assignments, career advancement, and interpersonal relationships;
8. Team coaching - In many situations, the time allotted for providing team guidelines, training, and coaching is very limited; in work teams, training and coaching are significant processes, especially when team sponsors/managers are held accountable for the team's outcome;
9. Team life span - The duration of the team project is usually short, hindering the necessary team building processes and leadership development;

10. Assessment - It is often difficult to assess students' teamwork skills in an environment where team assignments have different objectives and when instructors have different requirements and guidelines.

Given the possible factors and influences on teams, what must teams do to perform effectively? For the student, what teamwork skills must be developed in order to respond to the challenges of working in teams and to fulfill the individual as well as the team's potential?

TEAMWORK SKILLS AND LEARNING GOALS

A simple and useful framework for understanding teamwork skills is to distinguish between (a) task-specific versus task-generic competencies, and (b) between team-specific versus team-generic competencies (Cannon-Bowers *et al.*, 1995). For example, an effective legal team must have thorough grasp of the legal process and of the tactics of its opponents (task-specific competencies); similarly, the effective leader of a product development team will usually have intimate knowledge of team members' abilities, motivations, and individual and organizational idiosyncrasies (team-specific competencies). For Cannon-Bowers *et al.*, *transportable competencies* are those that are both team-generic and task-generic, that is, skills that can be applied in a variety of contexts and tasks. These competencies are not more or less critical to the success of the team than team-specific or task-specific competencies; they are, however, more general, "transferrable", and "teachable" (*Ibid.*, p. 340), and thus are of particular interest for higher education and professional training.

Among studies that are highly recognized in the teamwork skills literature are Benne and Sheats (1948), Hackman and Walton (1986), Larson and LaFasto (1989), Stevens and Campion (1994), Cannon-Bowers *et al.* (1995), and Thompson (2013). Some of these studies tend to view teamwork competencies as personal skills that members bring to the group while others define teamwork skills in terms of desirable roles that members are called to play at different instances and stages of the team. Still for others, competencies are group abilities, *i.e.*, behaviors that the group must display without necessarily ascribing specific competencies to any particular member. These perspectives are discussed below.

Benne and Sheats (1948) rejected the notion that the team leader is uniquely responsible for the quality and amount of production of the team and proposed a concept of team leader as multilateral shared responsibility. According to their view, competencies are related to group roles that team members are called to play and the team's performance depends on the awareness of what needs to be done and the ability of its members to deliver it. For Benne and Sheats team skills consist of task management skills (initiating, information seeking, opinion seeking, elaborating, energizing, coordinating, orienting, detailing, recording, and challenging) and interpersonal skills (encouraging, harmonizing, compromising, gate keeping, reflecting, following, standard setting).

Hackman and Walton (1986) differentiated between diagnostic skills (*i.e.*, intellectual tools and expertise to analyze the work environment and team dynamics) and execution skills for effective team leadership. Execution skills pertain to the hands-on tasks of leading team members, getting the best out of the team, and overcoming obstacles to implementing team actions, and comprise envisioning, inventive, negotiation, decision-making, teaching, interpersonal, and implementation skills.

Larson and LaFasto (1989) focused on individual behaviors and attitudes that are generally observed in members of successful teams. Highly effective team members have a realistic understanding of their roles and accountabilities, possess objective and fact-based judgments, are collaborative, make the team goal a higher priority than any personal objective, are willing to devote whatever effort necessary to achieve team success and share information, provide help to other team members, possess high standards of excellence, are supportive of team decisions, confront important issues with courage, play leadership in ways which contribute to the team's success, and respond constructively to feedback from others.

Stevens and Campion (1994) developed an instrument to assess the prospective team members' knowledge of teamwork knowledge, skills, and ability (KSA). They proposed 14 teamwork KSAs organized in two main categories and five subcategories. The main categories are interpersonal KSAs (which include five sub-categories: conflict resolution, collaborative problem solving, and communication) and self-management KSAs (which include two subcategories: goal setting & performance management, and planning & task coordination). Interpersonal KSAs (10 out of the 14 KSAs) are focused on the skills needed to foster healthy relations among team members, respect for others, and acceptance of different points of views. Self-management KSAs deal with the abilities to perform essential management functions such as goal setting and planning, organizing and coordinating group tasks, and ensure proper balancing of workload among team members.

Cannon-Bowers *et al.* (1995) identified seven teamwork competencies necessary for effective teamwork: (1) adaptability (process by which a team is able to use information gathered from the task environment to adjust strategies through the use of compensatory behavior and reallocation of intra-team resources); (2) shared situational awareness (process by which team members develop compatible models of the team's internal and external environment; includes skill in arriving at a common understanding of the situation and applying appropriate task strategies); (3) performance monitoring and feedback (ability of team members to give, seek, and receive task-clarifying feedback; includes the ability to accurately monitor the performance of teammates, provide constructive feedback regarding errors, and offer advice for improving performance); (4) leadership/team management (ability to direct and coordinate the activities of other team members, assess team performance, assign tasks, motivate team members, plan and organize, and establish a positive atmosphere); (5) interpersonal relations (ability to optimize the quality of team members' interactions through the resolution of dissent, utilization of cooperative behaviors, or use motivational reinforcement statements); (6) coordination (process by which resources, activities, and responses are organized to ensure that tasks are integrated, synchronized, and completed within the established temporal constraints; and (7) communication (process by which information is clearly and accurately exchanged between two or more team members in the prescribed manner and with proper terminology; the ability to clarify or acknowledge the receipt of information).

Finally, Thompson (2013) presented a comprehensive set of team leadership skills which a corporation uses in its 360-degree evaluation process. Essential team leadership skills are providing vision, showing entrepreneurship, influencing and convincing, achieving results, focusing on the customer, enhancing cooperation, empowering, managing change, and developing talents.

In management education the main challenge is to translate these perspectives into developing a set of teamwork skills that students will be able to exercise after the class or instructional program is finished. While in work teams the outcome is the main objective, in

classroom teams the primary concern is to develop individual students' individual skills. Certainly, an instructor is concerned with determining how effective members of a student team have developed their project. However, in program assessment the purpose is to ascertain whether students are well-equipped to perform in teams in a variety of contexts. This study focuses on individual-centered teamwork skills, that is, on the skills that Cannon-Bowers *et al.* (1995) call *transportable*. In an attempt to synthesize the various findings on teamwork skills, the contributions of the above authors are combined into ten skills sets (Table 1).

These teamwork skills form logical and meaningful groupings of the many skills presented in the literature. Note that one skill is not necessarily more important than another and it is not necessary that an individual master all ten teamwork skills in order to be an effective team member. Depending on the level of analysis, these skills are often combined into two or more generic skills, such as "people skills", "decision-making skills", or "leadership skills". Wageman *et al.* (2008) differentiated between "team design" and "hands-on" team skills. Team design skills, are more formal, broader, and are frequently tied to the overall learning goals of an academic program. These skills are often broken down and taught in smaller pieces to improve the students' 'soft' skills. By contrast, hands-on skills are more specific, less controllable, and even more challenging to teach and assess. These are the skills that are used to provide competent real-time team guidance in "what people usually have in mind when they talk about team leadership" (*Ibid*, p. 184). The hands-on skills are the skills employed on almost a continuous basis in face-to-face team interactions, when difficulties are encountered, when challenges to authority are posed, when disputes arise and emotions flare up, and when performance assessments bring a dose of reality to the team. The hands-on team skills are part and parcel of the nitty-gritty of group dynamics. They are harder to teach than team design skills, and are largely learned and improved through experience. In line with Wageman's insights, the skills the teamwork skills in Table 1 can be seen as five pairs of interrelated skills:

Communication skills	↔	Facilitation skills
Work planning and organization skills	↔	Task coordination skills
Problem-solving skills	↔	Conflict resolution skills
Interpersonal skills	↔	Coaching and collaborative skills
Leadership skills	↔	Performance monitoring skills

How can the teamwork skills valued in the workplace be translated into learning goals that can be used in higher education? Learning goals should be formulated in such a way as to provide meaningful feedback for students to enable the development of individual teamwork skills. Learning goals should not be confused with performance goals; while complementary, performance goals are geared toward grading and often respond to the instructor's need to assign individual grades for a team assignment. On the other hand, learning goals should reflect the ability of a student to perform effectively in teams in a variety of contexts, especially *after* they leave the classroom. Learning goals assume that students make mistakes and that these mistakes are often the foundation of further learning and skill development.

The ten skills presented in Table 1 can be combined into the following five learning goals suitable for program-level assessment:

1. Communication and facilitation skills - To express one self, to articulate the views of the group and sub-groups, and to elicit information from all members.
2. Planning, organization, and coordination skills - To plan, organize, and assign team tasks, to prioritize and coordinate activities, and to manage operational details.

3. Decision-making and conflict resolution skills - To use group decision-making effectively, to help to overcome impasses, and to resolve conflicts and to negotiate resources.
4. Interpersonal and collaborative skills - To work with others, to show empathy and treat group members with respect, and to promote solidarity and trust among team members.
5. Leadership and performance monitoring skills - To foster a unified vision and direction for the team, to clarify objectives and standards of performance, to energize and inspire members towards high performance, and to monitor team and individual performance.

A MODEL FOR DEVELOPING AND ASSESSING TEAMWORK SKILLS

Given the characteristics of classroom teams, an integrated model for developing and assessing students' teamwork skills is presented in Figure 2. The model can be seen as an application of Hackman's model of team coaching (2002, p. 178) to classroom-based teams. The theoretical underpinnings of the temporal model are threefold: team development, coaching, and assessment. According to Salas *et al.* (2002), teams must reach certain thresholds before acquiring additional skills. As such, the well-known stages model of team development introduced by Tuckman (1965) **–** forming, storming, norming, performing, and adjourning **–** provides the basic framework for the temporal model.

With regard to team coaching, a major tenet of Hackman and his colleagues' contributions rest on the role of coaching and external support systems that are put in place to assist teams: it is not enough to set the initial conditions for a team and expect that its members will readily develop appropriate processes without assistance; team coaching is critical for minimizing negative team interactions and maximizing positive team interactions (Hackman, 1987; Hackman & Wageman, 2005). Furthermore, as Ilgen, *et al.*, (2005) argue, viewing teams through the input-process-output model is too limiting; an input-mediation-output-input model which explicitly incorporates mid-course interventions as an essential part of improving team effectiveness and a feedback loop is critical for team success. More recently, Edmonson *et al.* (2008) contended that teams learn and that learning is aided by deliberate coaching and reflection. In higher education the importance of multiple points of monitoring and feedback to student teams is increasingly recognized (Hansen, 2006; Hillier & Dunn-Jensen, 2012).

Finally, team assessment and feedback are based on the general principles of the operant conditioning theory of learning, which asserts that behavior is maintained or modified by its consequences (Ferster & Skinner, 1957). Performance measurement and timely feedback is thus critical to team learning and individual performance (Salas, *et al.*, 2002). This suggests that feedback should not wait until the end of the team task (or until the end of the course) as the team has greater chances to learn and adapt when feedback is given in a timely manner.

The four phases of the proposed model are detailed below:

Beginning – Goals and expectations

This phase, which parallels with the forming-storming stages of the team development model, deals with clarifying learning goals and expectations. The focus of this phase is on providing information to all teams, motivating students towards achieving the expected outcomes and helping them to build their teams. The instructor acts as a presenter and discusses project requirements and guidelines.

In courses where teamwork learning goals are positioned, it is important that students have access to a variety of materials on teams prior to the start of their team projects. It is also suggested that information regarding goals and expectations, behavior guidelines, and evaluation rubrics be provided to all students. As suggested in the previous section, goals regarding teamwork skills should be formulated as observable outcomes.

At this stage there is no assessment. The objective is to provide the information and the means for setting a good environment for team members to coalesce and perform effectively. The instructor distributes reading materials to help students learn teamwork concepts, spells-out expectations, and motivates students to want to do well. Some authors suggest incorporating team building exercises, team contracts, project progress reports, clear definitions of team roles (Tropman, 2003), and explicit ground rules among others (*e.g.* Hansen, 2006; Hillier & Dunn-Jensen, 2012; Thompson, 2013).

Midpoint – Developmental coaching

This phase deals with assessing team progress and with providing feedback for individual and group development. It parallels the norming-performing stages of the team development model. The instructor's role is that of a coach and facilitator who is available for, and initiates, consultation and support. The focus of the mid-point intervention is on helping each team improve their team processes and deal effectively with problem members or disruptive behaviors. It should emphasize both enhancing positive interactions (process gains) and minimizing negative interactions (process losses).

As suggested by Wageman and Donnenfeld's (*Ibid*) the instructor must decide which of the four main types of team interventions (team redesign, team process coaching, conflict resolution, changing the individual) is the most appropriate to deal with the situations that revealed in the midpoint assessment. As discussed, timely and focused interventions are critical. Appendix A presents an instrument for midpoint assessment that can be completed online or in class by all team members. It includes space for students to write comments and suggestions in order to provide richer information to the instructor. This midpoint assessment is developmental in nature and ought not to be tied to any group or individual grades. The instructor meets with each team to review and address issues identified in the midpoint assessment. Corrective actions may be needed and it is important to determine which type of intervention is most appropriate to address faulty team processes and/or offer help to at-risk students (Zhang, *et al.*, 2014).

End – Evaluation

This phase deals with two distinct processes: (a) evaluating the team's projects and individual students' contributions for grading purposes, and (b) assessing each student's individual teamwork competencies. The instructor acts as a judge and adviser by assigning grades, conducting the peer and self assessment processes, and providing feedback. The focus is on providing meaningful feedback to students so that they can improve their individual teamwork skills. This phase parallels the performing/adjourning stages of the team development model.

Appendix B presents a possible form for evaluative purposes, one that rates students on two holistic dimensions: individual contributions to the task and individual contributions to team processes. The form can be used at the end of a class period or at the end of an exam to collect

input from all students, simultaneously and independently. When both evaluative and developmental processes are involved, grading and assessment should be two totally distinct and separate procedures. This can be accomplished by collecting feedback at different times, using different forms, and even utilizing different technologies. In terms of collecting assessment information on teamwork skills, class time constraints and teamwork performed outside the class may severely limit the instructor's ability to directly observe each student working in a team (Varela, Burke & Michel, 2013; Logan, 2015). Thus, it is proposed that peer assessments are a feasible and useful method for providing developmental feedback to the members of a team (Loughry *et al*., 2007). At the end of the course, every student completes an assessment of the individual performance of all his/her team members. These peer assessments should be based on behavior descriptors of performance in order to minimize differences in interpretation of the rating scale. An example of an online form used by the authors is shown in Appendix C.

Future – Assessment for program improvement

In both work and educational settings, there are three distinct but related purposes for assessment: evaluative, developmental, and outcome assessments. While evaluative and developmental approaches are used to provide feedback to an individual about his or her performance, the primarily goal of outcome assessment is to determine how well a program or a pedagogical approach is meeting, in the aggregate, the desired learning goals. The main difference between evaluative and developmental assessments is that the goal of the former is to distribute rewards or bonuses (or students' grades in classroom teams) while the goal of the latter is to provide specific feedback for improvement (Gueldenzoph & May, 2002; Crutchfiled & Klamon, 2014; Elbeck & Bacon, 2015). Evaluative assessment focuses on knowledge and contributions of the individual, while developmental assessment focuses on individual skills and behaviors. It is also important to differentiate between assessing the *team*, (*i.e*. its characteristics, processes, resources, and support) and assessing its *team members* (Brannick, Salas, & Prince, 1997; Drexler, Beehr, & Stetz, 2001). When assessing a team characteristic (*e.g*., composition) or a team process (*e.g*., communication), the focus is on the team as whole, and the purpose of the assessment may be to decide whether the team is working as effectively as possible or whether it needs additional resources and support.

The focus of the final phase is to determine whether the learning goals are being met and to improve the design of the instructional experiences for future implementation. This is the assessment phase which involves the course instructor, program coordinator, and possibly other instructors. The instructor's role is that of an analyst of information and designer of new learning experiences. In addition to the information collected from peer assessments, Appendix D presents an example of a form used by the authors to collect information about students' self-awareness of learning and satisfaction with the team experience. Free-form comments are also collected in order to provide richer feedback to instructors.

DISCUSSION AND CONCLUSION

As recognized in the literature, teams will continue to be a vital element of organizations of all types and sizes and "will remain the basic unit of both performance and change because of their proven capacity to accomplish what other units cannot," (Katzenbach & Smith, 1993, p. xxx). In the educational context, developing and assessing students' teamwork skills continues

to be a challenging topic for instructors and program coordinators. What should the goals of teamwork development be in higher education? What teamwork skills should be emphasized in team projects? What roles should the instructor play at the various stages of the learning process?

This article contrasted the characteristics of work teams and student teams and identified many critical differences. It is apparent that what is required or highly promoted in work teams is often discouraged or barred in student teams, not by accident but by design, as work organizations and educational systems have very different purposes and performance criteria. Thus, we developed an integrated approach that recognizes this distinction and responds to the needs to fulfill developmental, evaluative, and assessment objectives. As suggested in the literature on workplace teams, the temporal model has a midpoint diagnosis of the team processes and includes an instrument that is specifically designed for use in an instructional setting. The evaluative form completed at the end of the team project is based on holistic evaluations of a student's contributions to the task and to the team. Based on a review of the literature on teamwork skills, essential teamwork skills valued in the workplace were identified. Five learning goals for use in an instructional environment were developed and a peer assessment instrument for the five learning goals is presented. Finally, recognizing the value of self-efficacy for continuous improvement, the authors provide an instrument for students' self-assessment of teamwork that is tied to the proposed learning outcomes.

Students have much to gain from the experience of working in classroom teams. It is important for educational and management training programs to adopt clear collaborative learning goals that are geared toward transportable teamwork skills. Whether teaching a course on teams or a course that involves team projects, we look forward to instructors incorporating current teamwork theories in their pedagogies and, at minimum, implement one midpoint diagnosis. In addition, planning for differentiated team interventions and providing timely and meaningful feedback to teams and team members is an achievable goal in most settings.

However, there are still many opportunities to enhance our student's range of team experiences. How can one provide students the opportunity to experience different levels of authority and autonomy in teams? How can instructors simulate more complex types of tasks and richer organizational contexts? Should one design team projects that will enable students to exercise all teamwork skills or should the exercises focus on honing one or few skills? As the need for teamwork skills and collaborative learning increases, we need to design bolder team experiences for our students, consider exercises and contexts that will allow them to cope with different levels of authority and autonomy, and experience distinct types of task interdependency.

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Figure 1. Challenges for Classroom Teams

ORGANIZATIONAL SUPPORT
Instructor coaching

• Limited interaction with instructor
• Limited monitoring and interventions by the instructor
• Little instruction on desirable team behaviors

INITIAL SETUP
Team assignment

• Random team assignments
• Limited member differentiation
• Unclear roles
• Few rewards

TEAM PROCESSES
• No differentiated leader
• Limited time to interact
• Limited freedom to decide team goals or organization

OUTCOME ASSESSMENT

• Course content vs. team skills emphasis
• Unclear definition of desired team competencies
• Inconsistent teamwork assessment instruments, if any

• Interaction w/ other teams is prevented
• Use of social networks is largely discouraged

SOCIAL SUPPORT
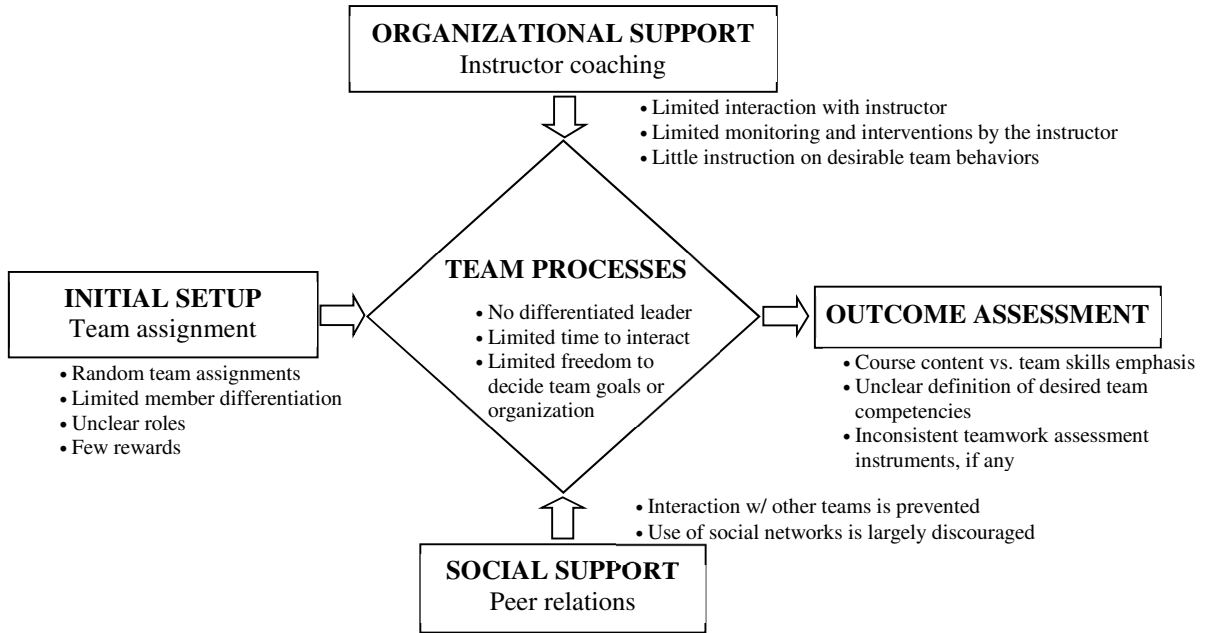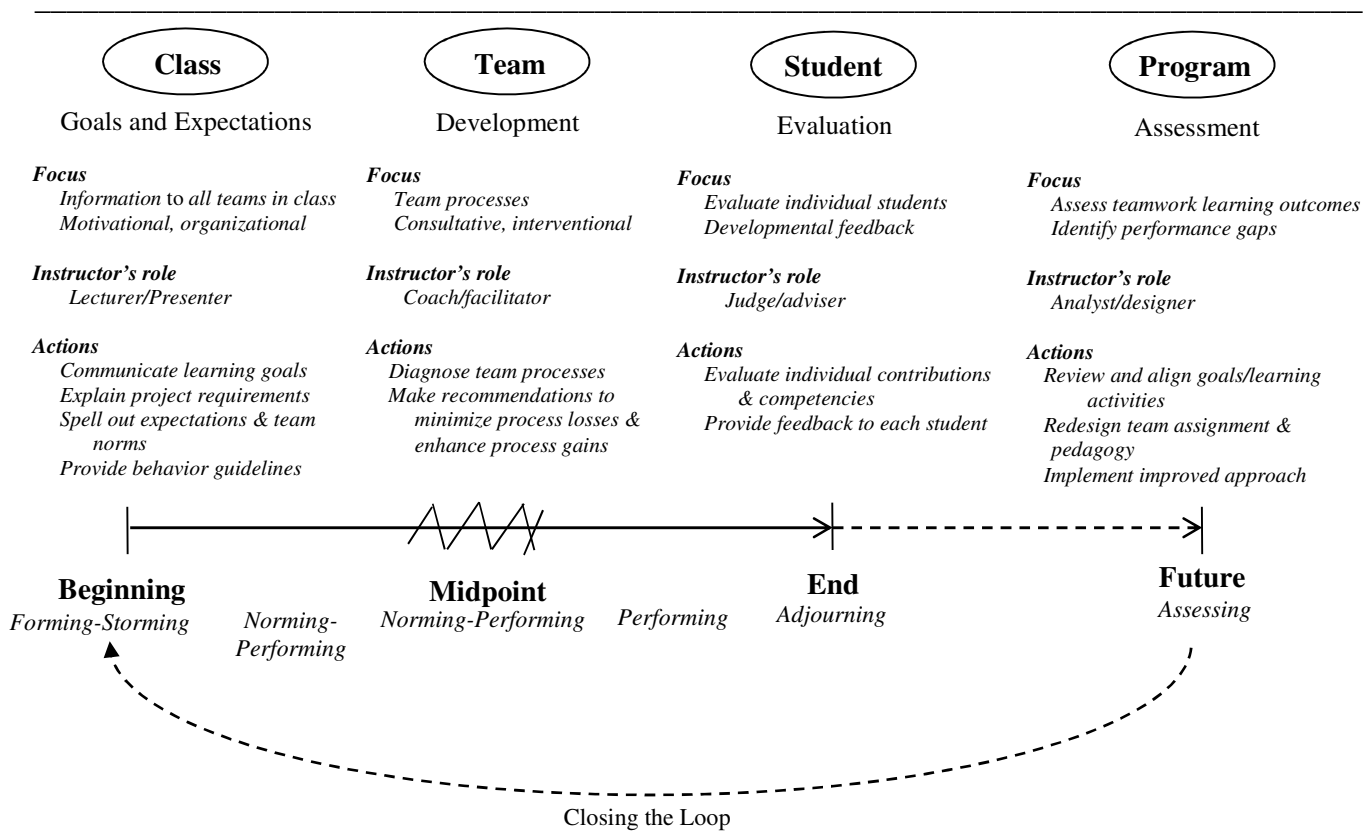Peer relations

Table 1. Teamwork Skills

Skill	Description
Communication skills	Ability to express oneself and articulate views of the group and sub-groups, and to understand and effectively use communication networks.
Facilitating & information sharing skills	Ability to promote and clarify communication among team members, to elicit unique and different types of information, and to manage information sharing process effectively.
Work planning & organization skills	Ability to plan and organize group tasks, to prioritize activities and to identify resources needed.
Task coordination skills	Ability to direct activities of members, to shift resources and expedite processes when needed, to take care of operational details, to recognize changes in the environment and to adjust plans.
Collaborative problem solving & group decision-making skills decision	Ability to question the group assumptions and decision-making methods, to maintain independent and fact based judgments, to arrive at a multi-faceted understanding of the situation, to foster creativity, and to manage group decision-making processes effectively.
Conflict resolution skills	Ability to persuade others, to recognize and reconcile differences of opinion, to use strategies to resolve disputes and overcome impasses, to negotiate to secure or reallocate resources.
Interpersonal skills	Ability to show empathy toward the feelings or conditions of others, to recognize the importance of and engage in ritual social behaviors, to promote solidarity and trust among team members, to treat others with respect, and to recognize when an intervention may be necessary.
Coaching & collaborative skills	Ability to work with others, to help others, to motivate and instruct others, and to adjust behaviors for the success of the team.
Leadership skills	Ability to provide a compelling vision of a desired end state, to set a direction for the team, to carry out important initiatives for the group, to energize and inspire others.
Performance monitoring skills	Ability to maintain focus on task, to clarify objectives and standards of performance, to monitor team and individual performance, to provide constructive feedback and to devise necessary corrective actions.

Figure 2
Temporal Model for Developing and Assessing Students' Teamwork Competencies

| **Class** | **Team** | **Student** | **Program** |
| Goals and Expectations | Development | Evaluation | Assessment |

Focus
  Information to all teams in class
  Motivational, organizational

Focus
  Team processes
  Consultative, interventional

Focus
  Evaluate individual students
  Developmental feedback

Focus
  Assess teamwork learning outcomes
  Identify performance gaps

Instructor's role
  Lecturer/Presenter

Instructor's role
  Coach/facilitator

Instructor's role
  Judge/adviser

Instructor's role
  Analyst/designer

Actions
  Communicate learning goals
  Explain project requirements
  Spell out expectations & team norms
  Provide behavior guidelines

Actions
  Diagnose team processes
  Make recommendations to minimize process losses & enhance process gains

Actions
  Evaluate individual contributions & competencies
  Provide feedback to each student

Actions
  Review and align goals/learning activities
  Redesign team assignment & pedagogy
  Implement improved approach

Beginning   *Norming-*   **Midpoint**   *Performing*   **End**   **Future**
Forming-Storming   *Performing*   *Norming-Performing*   *Adjourning*   *Assessing*

Closing the Loop

APPENDIX A
Midpoint Evaluation of the Team

Name: _____

Please read each statement carefully and circle the number that best describes the current situation in your team. Note that statements marked with an **(R)** have a reverse scale, that is, stronger agreement indicates a less favorable situation.

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
1. My team encourages open communication and my contributions are valued.	1	2	3	4	5
2. We share work-related information in a timely manner.	1	2	3	4	5
3. **(R)** Different points of view are often dismissed or criticized.	1	2	3	4	5
4. Team tasks are organized in a logical way and assigned to appropriate team members.	1	2	3	4	5
5. Our team developed a timeline and everyone is on track.	1	2	3	4	5
6. **(R)** I don't know who is doing what and who will put individual contributions together.	1	2	3	4	5
7. We all participate in group decision-making.	1	2	3	4	5
8. We handle conflicts among ourselves well.	1	2	3	4	5
9. **(R)** Every time there is a difference of opinion, conflicts emerge among us.	1	2	3	4	5
10. I feel welcome in my team and I am treated with respect.	1	2	3	4	5
11. There is a climate of trust and support among us.	1	2	3	4	5
12. **(R)** There is animosity and rude behavior among some members of my team.	1	2	3	4	5
13. We have a leader who effectively inspires us and motivates high performance.	1	2	3	4	5
14. Our team effectively deals with incidents of poor quality or cooperation by its members.	1	2	3	4	5
15. **(R)** Our team leader gives inappropriate criticism and preferential treatment.	1	2	3	4	5
16. I understand my team's goals and what we are supposed to accomplish.	1	2	3	4	5
17. My instructor is accessible to meet with me or with the team.	1	2	3	4	5
18. **(R)** I feel there is insufficient support from the instructor.	1	2	3	4	5
19. There is a high level of cooperation and dependability among us.	1	2	3	4	5
20. We support one another when there is need for help with a specific task.	1	2	3	4	5
21. **(R)** I have no one to turn to whenever I need help with a task.	1	2	3	4	5
22. All my team members put enough effort to accomplish group tasks.	1	2	3	4	5
23. All my team members come to meetings on time and prepared.	1	2	3	4	5
24. **(R)** I am concerned that some teammates are not putting enough effort in their tasks.	1	2	3	4	5
25. I am very satisfied with the quality of the work of my team.	1	2	3	4	5
26. Working on this team stretches my knowledge, skills and creativity.	1	2	3	4	5
27. **(R)** Working on this team is an exercise in frustration for me.	1	2	3	4	5

How many times did your team meet as a whole, as of today? _____
How many times did you meet with other team members to work on the team project? _____
What has your team done quite well so far?

_____
_____
_____

What do you think your team needs to do better?

_____
_____
_____

What type of intervention would be more appropriate at this time? *(check all that apply)*
___ Additional clarifications of goals and/or assignment
___ Additional time to meet with team or instructor
___ Additional guidelines or materials
___ Change in team membership
___ Intervention directed at a specific team process or issue; explain _____
___ Other; explain _____

Justify:_____
_____
_____

APPENDIX B
Peer Evaluation of Team Members' Contributions

Name: _____

Member contributions to the team *Task*

Rate each member according to the extent he/she performed the assigned tasks and was well prepared, contributed valuable ideas, showed initiative and innovation, did valuable research and analysis, completed assignments on time, and performed work of high quality.

Members names	Member contribution to team tasks						
	Low						High
Self	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

Member contributions to team *Processes*

Rate each group member according to the extend he/she attended meetings, was flexible in accommodating group needs, listened and was supportive of others' contributions, was respectful of others, contributed to a healthy group atmosphere, managed conflict effectively, encouraged others to participate, and demonstrated leadership skills.

Members names	Member contribution to team processes						
	Low						High
Self	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

APPENDIX C
Peer and Self-Assessment of Teamwork Skills

Name: _____

This assessment will not be used for grading you or the members of your team. Be forthright to assist your team members' self-improvement. For each skill set, circle the descriptor that best characterizes the behavior of each member.

Communication and facilitation – *ability to express oneself, to articulate the views of the group and sub-groups, and to elicit information from all members.*

Level of skill of each team member

Representative behaviors at increasing levels of skill	Name	Circle one				
1. Was unable to express ideas, never listen to others; dismissed non-conforming information, obstructed others from expressing different opinions	Self	1	2	3	4	5
2. Repeated what others had stated without adding much new or valuable; seldom listened to different opinions; was reluctant to share information	_____	1	2	3	4	5
3. Was able to articulate own thoughts and opinions, listened to others, encouraged others to participate, and shared information	_____	1	2	3	4	5
4. Contributed new ideas and insights; listened to many opinions; asked probing questions; rephrased opinions, prevented others from obstructing different points of view	_____	1	2	3	4	5
5. Articulated effectively positions of the group or sub-groups; was effective in speaking for the group; encouraged and compared different points of view; drew out new information from group members	_____	1	2	3	4	5

Planning, organization, and coordination – *ability to plan, organize, and assign team tasks, to prioritize and coordinate activities, and to manage operational details.*

Representative behaviors at increasing levels of skill	Member	Circle one				
1. Was unwilling to coordinate activities with others; disrupted coordination efforts; did not help others even when asked	Self	1	2	3	4	5
2. Was at times reluctant to coordinate tasks or delegate tasks; was ineffective or reluctant to help others	_____	1	2	3	4	5
3. Coordinated activities with others; was valuable in getting things done on time; occasionally, helped or instructed others	_____	1	2	3	4	5
4. Suggested improvements and helped the group become more effective; helped monitor the meeting of deadlines; prioritized tasks and delegated work to others; was always willing to help others	_____	1	2	3	4	5
5. Was instrumental in organizing the group task into individual components and assigning them to the team members; set deadlines for different tasks; voiced concerns when others did not do their parts; showed great skill at clarifying goals, pointing out what needed to be done and instructing others	_____	1	2	3	4	5

Decision-making and conflict resolution – *ability to use group decision-making effectively, to help to overcome impasses, and to resolve conflicts and to negotiate resources.*

Representative behaviors at increasing levels of skill	Member	Circle one				
1. Insisted on "my way or no way; worked against team decisions; was contentious	Self	1	2	3	4	5
2. Was reluctant to participate in group decisions; often emphasized the people involved rather than the issues to be resolved	_____	1	2	3	4	5
3. Participated effectively in group decisions; worked to implement group decisions	_____	1	2	3	4	5
4. Was able to bring others to compromise; was effective in helping to overcome an impasse	_____	1	2	3	4	5
5. Organized decisions into coherent and logical sets; was effective in implementing specific group decision processes (e.g., voting); was skillful in resolving differences of opinion and conflicts	_____	1	2	3	4	5

Interpersonal and collaborative – *ability to work with others, to show empathy and treat group members with respect, and to promote solidarity and trust among team members.*

Representative behaviors at increasing levels of skill	Member	Circle one				
a. Was rude and disrespectful of others; brazen to others of different background, gender, race, or ability	Self	1	2	3	4	5
b. Was generally respectful but was often dismissive of others; favored cliques or factions; was distrustful	_____	1	2	3	4	5
c. Cultivated good relationships with others; interacted effectively with people of different backgrounds	_____	1	2	3	4	5
d. Interacted appropriately with all team members and helped to promote harmony in the group	_____	1	2	3	4	5
e. Was critical in establishing a climate of acceptance and trust in the team; displayed effective social behaviors to bring harmony to the group; recognized and helped correct discriminatory or improper behaviors of others	_____	1	2	3	4	5

Leadership and performance monitoring – *ability to foster a unified vision and direction for the team, to clarify objectives and standards of performance, to energize and inspire members towards high performance, and to monitor team and individual performance.*

Representative behaviors at increasing levels of skill	Member	Circle one				
1. Did not express opinions; waited for direction from others	Self	1	2	3	4	5
2. Occasionally expressed opinions; did not take initiatives	_____	1	2	3	4	5
3. Expressed opinions earnestly; was an independent thinker; took initiatives at times	_____	1	2	3	4	5
4. Was effective in persuading the team to adopt a position; took many initiatives; clarified objectives	_____	1	2	3	4	5
5. Was able to inspire others; set high standards and expectations for self and the team;; was instrumental in setting a direction for the team and keeping the team focused	_____	1	2	3	4	5

APPENDIX D
Students' Self-Assessment of Teamwork Learning

Name: _____

Please read each statement carefully and circle the number that best describes the extent of your agreement or disagreement.

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
1. My abilities to express myself in a group setting and to articulate the views others is improved.	1	2	3	4	5
2. My ability to facilitate communication in a group setting and to elicit ideas from everyone is improved.	1	2	3	4	5
3. My ability to plan and organize group tasks and develop priorities is improved.	1	2	3	4	5
4. My ability to direct the activities of different people and to take care of operational details is improved.	1	2	3	4	5
5. I improved my ability to analyze a situation, to make fact-based judgments, and to foster creativity and effective group decision-making methods.	1	2	3	4	5
6. I improved my ability to reconcile differences of opinion, resolve disputes, and overcome impasses.	1	2	3	4	5
7. I learned to promote solidarity and trust among team members, and to deal with people with different goals, abilities, and backgrounds.	1	2	3	4	5
8. I became a better at working in a group and at being supportive of others when help is needed.	1	2	3	4	5
9. I improved my ability to develop a goal, inspire others, and set challenging goals for myself and the team.	1	2	3	4	5
10. I improved my ability to focus on a task, to clarify group objectives, and to monitor the performance of a group.	1	2	3	4	5

The two most significant things that I learned about teams are:
_____
_____
_____

The two teamwork skills that I improved the most are:
_____
_____
_____

The two teamwork skills that I need to improve most are:
_____
_____
_____