

Running Head: PREDICTING TEAM MEMBER PERFORMANCE

Predicting Individual Team Member Performance:
The Role of Team Competency, Cognitive Ability, and Personality

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A Thesis Submitted in Partial Fulfillment of the Requirements for the
Degree of Master of Science in Applied Psychology (Industrial/Organizational)

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Predicting Individual Team Member Performance:
The Role of Team Competency, Cognitive Ability, and Personality

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Submitted October 14, 2003

Abstract

The prevalence of teams in organizations is a growing phenomenon. Successful teams have the potential of providing many benefits to both the individual and the organization. Competency based management may present human resource practitioners with an optimal method for selecting high-performing individuals. This thesis attempted to uncover the competencies associated with an effective team performance. In the first study, using the critical incident technique, eight competency-like domains representing individual team performance emerged: initiative, subject matter expertise, problem solving, communication, collaboration/cooperation, motivation of others, organization, and dedication. A competency-based questionnaire was created from these eight competency-like domains. A second study attempted to evaluate the construct validity of the scale. Factor and correlational analyses supported the existence of a single Global Competency factor underlying the eight domains found in Study I. The second study also demonstrated that the Global Competency factor was a better predictor of team performance than measures of the Big Five personality dimensions and IQ.

INTRODUCTION

In the 1990s, businesses became more concerned with people. “Putting people first” developed into a catch phrase that was enthusiastically endorsed by human resource departments everywhere (Hofrichter & McGovern, 2001). Although the concept of “competencies” was not completely new, it gained momentum during the “people decade” of the 1990s. Competency-based management was considered to be a people-based tool with both versatility and great explanatory power. The concept of catering to individual competencies came to represent the best way to align individual behaviour with corporate interest. Competencies are a remarkable tool for shaping organizational behaviour by allowing practitioners and human resource directorates to define in detail what is involved in a job. Creating behaviourally based descriptions of jobs enables an organization to assess recruits, manage performance, and identify training needs with both objectivity and precision. The purpose of the present study is to discover the competencies required of an individual to be an effective team member. Furthermore, the study will compare the use of competencies to personality dimensions and IQ in predicting individual team performance.

The Competency-Based Approach

Origins of Competency-Based Approach

David McClelland, a Harvard University psychologist, first introduced the competency-based approach into the human resource literature over 25 years ago. He suggested that competency variables could be used as predictors of job performance that are not biased by race, gender, or socio-economic factors. McClelland’s (1973) research provided evidence that competencies are better predictors of performance than intelligence or ability tests. This new approach sparked an on-going debate as to the reliability and validity of the competency method (Barrett, 1994; Barrett &

Depinet, 1991; McClelland, 1974). Nevertheless, competency based management has gained popularity within the HR community, and has largely been accepted due to the ongoing work of McClelland and his associates, especially Richard Boyatzis, at McBer and Company, now part of the Hay Group (Catano, 1998).

Defining Competencies

The use of competency-based management has been a growing trend in organizations. Although there appears to be a general understanding as to what competencies are, there exists no universally accepted definition. Boyatzis (1982) has been credited with popularizing the term *competency*. He indicates that a competency is a combination of a motive, trait, skill, aspect of one's self-image or social role, or a body of relevant knowledge (Boyatzis, 1982). Others refer to competencies as underlying characteristics which are causally related to effective or superior performance on a job (Briscoe & Hall, 1999), a cluster of related knowledge, attitudes, and skills that correlates with performance on the job (Parry, 1998), skills and traits required to be effective in a job (Mansfield, 1996), knowledge, skills, abilities and behaviours associated with successful performance on the job (Mirabile, 1997), and behaviours that a superior performer would exhibit more than average performers (Klein, 1996). Companies and organizations often approach competencies from a more applied perspective. A summary of research findings of companies from the Corporate Leadership Council defines competencies as “the behaviours and skills associated with an individual's need to perform a specific function of a job” (Professional Development Manager, company A), “desired behaviours in employees”, and “behaviours that we embrace as an organization and want people to demonstrate” (Corporate Leadership Council, 1998, p. 6). Although there are some discrepancies in defining competencies, some key features emerge: (a) knowledge,

skills, abilities and other qualities (KSAOs) that are required for successful job performance, (b) the KSAOs must be observable and measurable, and (c) the KSAOs should be used to distinguish superior from less superior employees (Catano, 1998).

Team Competencies

Traditional hierarchical organizations are becoming something of the past. As we move further into the 21st century, organizations are becoming flatter in nature and employees are taking on more and more responsibility. Along with this flattening of traditionally hierarchical organizations is the continued dominant presence of teams (Guzzo & Salas, 1995). In medium to large size corporations, “team presence” has increased from 5% in the early 1980s to over 50% in the mid 1990s (Savoie, 1998). Teams in work environments are created for diverse tasks and their life expectancy can range from the length of a given meeting to the duration of an organization (Fiore, Salas, & Cannon-Bowers, 2001). Although work teams have been defined somewhat differently, there appears to be a general consensus that work teams are comprised of multiple individuals who are interdependent because of the tasks and goals they share as a group, and who are embedded in a broader organizational setting (Horvath & Tobin, 2001; Sunstrom, de Meuse, & Futrell; 1990, Guzzo & Dickson, 1996). Effectiveness in a work team is indicated by collective outputs, the consequences a group has for its members, and the enhancement of a team’s capability to perform effectively in the future (Guzzo & Dickson, 1996).

There are numerous types of teams. With each type of team come different responsibilities and tasks. Four types of teams can be identified in organizations today: (a) work teams, (b) parallel teams, (c) project teams, and (d) management teams. Work teams are what most people think of when discussing teams. They are continuing work units responsible for producing goods and services. Self-managed

work teams or autonomous work groups are found within the category of work teams. Members of self-managed work teams are typically cross trained in a variety of skills, and are involved in making decisions that typically would be delegated to a supervisor or manager (Cohen & Bailey, 1997). Examples include self-managing engineering workshop teams and telecommunications teams. Parallel teams are composed of people from different work units in order to perform functions that the regular organization is not equipped to perform. These teams generally have limited authority and can only make recommendations to individual higher up in the organizational hierarchy (Cohen & Bailey, 1997). Examples include quality improvement teams and task forces. Project teams are time-limited. They draw members from different disciplines and functional in order to apply specialized expertise and knowledge to the project at hand. Once the project is complete, the team is disassembled (Cohen & Bailey, 1997). An example of a project team would be a new product team within a computer firm. Management teams coordinate and provide direction to the sub-units under their jurisdiction. This team is responsible for the overall performance of a business unit (Cohen & Bailey, 1997).

The potential of a team can be assessed by considering individual members' skills, knowledge and abilities. However, one must also consider the team's motivation towards making the best use of its members' resources in achieving its goals. There is more to a team than its members' combined skills. The emotional attachments and group dynamics are also important to consider. Work teams meet the needs of employees for a more meaningful work environment while simultaneously helping to facilitate the attainment of organizational goals (Neuman & Wright, 1999).

A number of factors influence team performance. Cannon-Bowers, Tannenbaum, Salas & Volpe (1995) proposed a model in which organizational and

situational factors affect work and task characteristics. These characteristics then determine which competencies are needed for successful team performance. The competencies included individual task competencies and team competencies. Team competencies are the qualities needed by an individual when working on a team. These include (a) the knowledge, principles and concepts underlying the team's effective task performance, (b) the skills and behaviours needed to perform the team task effectively, and (c) the appropriate attitudes on the part of team members that foster effective team performance (Cannon-Bowers et al., 1995; Horvath & Tobin, 2001). In order for an individual to be an effective team member, team competencies are needed.

The situational and task characteristics influencing a team determine the type of competencies required. Team competencies are often viewed in four categories depending on the relation to the task and the relation to the team (Cannon-Bowers et al., 1995; Horvath & Tobin, 2001). Context-driven competencies are dependent on both the specific nature of the task and the individual members of the team. Team-contingent competencies are specific to a unique team but are generic in respect to the task. Task-contingent competencies are dependent upon the specific nature of the task but can apply to a variety of teams. Transportable competencies are not specific to any to any particular task or team. They are generic competencies found across different types of teams doing different types of tasks.

This thesis explores transportable team competencies. More specifically, it examines the generic competencies of self-managed work teams (SMWT). Transportable competencies are needed when working on a variety of tasks and with a variety of teams. Examples of such teams include task forces, process-action teams, ad-hoc teams and project teams. Determining generic competencies may have further

benefits. Having employees that contain transportable team competencies may enable a company to select employees that it knows can be counted on to be team players. Considering that more and more organizations are being team driven it seems logical that corporations would want to maximize the use of its employees. By being able to select employees that have generic and transportable team competencies a company can feel more confident in its ability to move employees within different teams in the organization and in the employee's ability to perform different tasks within a team context.

Purpose of the Thesis

The purpose of the thesis was to create a competency profile that demonstrates effective performance of individual team members by establishing Global Competency Index that contains competency-like elements that are transportable to all types of teams. The elements in the index are not task specific or team specific. A questionnaire based on the competency elements was created and used to compare the value of the team competencies versus that of personality traits and intelligence in predicting individual performance in a team context. The use of personality traits and intelligence testing in selecting effective team members will be further discussed later in the thesis.

Hypothesized Competencies

High team performance requires that team members have specific competencies that are needed to do teamwork. As teams have evolved and become more pervasive in industry, different knowledge, skills and abilities required for effective teamwork appear to be necessary. The following section summarizes information concerning the applicability and effectiveness of various competencies

within the team context and articulates some of the competencies that team members should possess in order to be effective individual team members.

Adaptability

The ability to absorb change and to cope adaptively is critical to the ongoing survival of organizations. Adaptability is concerned with learning through experience (Militello, Kyne, Klein, Getchell, & Thorsden, 1999). An effective team must be able to assess its own environment, and adapt quickly to changing requirements (Militello et al., 1999).

Cannon-Bowers, Salas and Converse (1993) argue that effective team members are able to adapt to anticipate other member's information needs due to the shared mental models among team members. Furthermore, research suggests that effective self-managed team members monitor their own work and alter their performance patterns to resolve work problems (Wageman, 1997). Altman Dautoff (2002) defined resilience as "an individual's ability to resist or effectively cope with stressors, to tolerate risks, and to be flexible and confident in his or her ability to successfully deal with situations with minimal untoward effects" (p.11). Altman Dautoff's definition of resilience is reminiscent of the ability to adapt to the environment and imposed stressors. Moreover, Altman Dautoff found that "flexibility" was one of the two most important resilient characteristics identified as being crucial to the team's success (the other important resilient characteristic was "confidence to solve a problem"). Serfaty and Entin (1997) support the notion that superior teams are able to adapt to task demands. For individuals and teams operating in stressful decision-making environments, superior performance is often associated with a high degree of flexibility in decision-making and teamwork that is achieved through successful strategies of adaptation to stress (Serfaty & Entin, 1997). Baker

and Salas' (1992) cite adaptability as a skill dimension that supports effective teamwork.

Adaptability has been defined as the process by which a team member is able to use information gathered from their task environment to adjust their strategies. This may be accomplished through compensatory adjustment and timing, mutual performance monitoring, and error adjustment (Cannon-Bowers et al., 1995).

Hypothesis 1. Adaptability is a competency displayed by individuals who perform effectively in teams.

Communication

Lack of communication and ineffective communication have negative effects on a team's work processes and performance. Communication is an essential competency for teamwork. For example, Horvath and Tobin (2001) note that communication is a competency needed by both virtual and traditional teams.

Yeatts and Hyten (1998) found that a manufacturing SMWT was highly effective because of its members' abilities to effectively communicate with one another. The team's communication style was described as honest, frank, continual and regular. Their ability to freely ask for help when needed and to learn from each other's mistakes had positive effects on their performance.

The aviation industry uses a form of human factors training with their flight crews and other teams called crew resource management (CRM). CRM is designed to reduce errors and accidents, and to improve emergency response capability by improving teamwork skills (Flin, 1995). One of the main topics focused on by CRM training is communication. Past communication modules applied in aviation CRM training have included the basic communication process, barriers to effective communication, and awareness of strengths and weaknesses in personal

communication skills. Exercises highlight the importance of feedback and listening skills, the role of non-verbal communication and effective communication techniques (Flin, 1995). Guzzo and Dickson's (1996), in their review of Crew Resource Management, state that effective crew coordination is in large part a function of effective crew communications.

Baker and Salas (1992) maintained that communication is a skill dimension associated with effective team performance. Effective communication among team members not only includes the ability to clearly present a message verbally, but also the ability to actively listen and to interpret nonverbal messages (Steven & Campion, 1994). Communication also includes the ability to give effective feedback to team members, as well as the ability to receive criticism. Feedback involves providing information regarding other members' performance, requesting input or guidance regarding performance, and accepting positive and negative information regarding performance (Militello et al., 1999).

Communication is also an important skill dimension for teamwork (Cannon-Bowers et al., 1995). Cannon-Bowers et al. reviewed numerous different teams such as US Navy command and control teams and cockpit crews, all of which cited communication as an essential skill required. They defined communication as "the 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" (p.345).

Hypothesis 2. Communication is a competency displayed by individuals who perform effectively in teams.

Collaboration/Cooperation

Yeatts and Hyten (1998) refer to collaboration and cooperation as the act of two or more people working together for a common purpose. Cooperation enables team members to reduce the amount of time spent on activities indirectly related to the task (i.e., time spent on disagreements) and can increase the amount of effort placed directly on doing the team related task. Moreover, cooperation can enhance team member motivation and effort, as team members believe that cooperation will enable them to achieve tasks and reach goals that could not be accomplished otherwise (Yeatts & Hyten, 1998). Vinokur-Kaplan (1995) found collaboration to be a positive predictor of interdisciplinary hospital treatment team members' perception of their overall effectiveness and individual well-being. Fiore, Salas and Cannon-Bowers (2001) suggest that information sharing between team members is a critical component of effective teamwork. A collection of individuals each contributes unique input to a team, thus increasing the knowledge the group as a whole possesses. However, if the team is unable or unwilling to share this information, then there is little benefit from their meeting (Fiore et al., 2001). Thus a team may be composed of highly knowledgeable team members, but if they are unable to share the information their knowledge will have little influence on the performance of the team. Hyatt and Ruddy (1997) found cooperation to be a dimension associated with work group effectiveness. Steven and Campion (1994) maintained that collaborative problem solving includes: (a) possessing the KSAs to identify situations requiring participative group problem solving and to utilize the proper degree and type of participation, and (b) possessing the KSAs to recognize the obstacles to collaborative group problem solving and to implement appropriate corrective action. Coordination can be defined as the process by which team resources, activities and responses are organized to

ensure that tasks are integrated, synchronized and completed within established temporal restraints (Cannon-Bowers et al., 1995)

Hypothesis 3. A form of collaboration and cooperation is a competency displayed by individuals who perform effectively in teams.

Collective Orientation

Cannon-Bowers et al. (1995) suggest that an important attitude for team members to possess is that of a well developed team concept; that is, the belief in placing the team's goals above and beyond those of its individual members. Guzzo, Yost, Campbell and Shea (1993) present the concept of group potency, which they refer to as the groups' collective belief that they can be successful. They found that the strength of this collective belief significantly predicted group effectiveness in customer service and other areas of study. Driskell and Salas (1992) found that collectively oriented team members--members who exhibit more interdependent behaviour in task groups--were more likely to attend to task inputs of other team members and to improve their performance during team interaction than were egocentric team members. Hyattt and Rudy (1997) argue that work group morale is a dimension essential to effective teams. This includes the extent to which group members believe in the work group strategy and prefer working as part of a group rather than alone.

Cohesion, synonymous with collective orientation, is the degree to which members of a team feel attracted to their team and compelled to stay in it (Yeatts & Hyten, 1998). Yeatts and Hyten (1998) found that team oriented cohesiveness resulted in self-managed work team (SMWT) members being committed to one another and providing extra effort to please their teammates. High cohesiveness within the SMWT positively influenced effort that team members put into their work.

Wraparound team members from a large midwestern state, identified as experts in teaming, identified team cohesion as a critical aspect of the team process (Fleming & Monda-Amaya, 2001). Panelists stated that trust and respect among team members, as well as outside recognition for their work, were critical variables for effectiveness.

Hypothesis 4. Collective orientation is a competency displayed by individuals who perform effectively in teams.

Conflict Resolution

The ability to effectively manage and resolve conflict may be an important interpersonal attribute for team members (Abramson, 1989; Sundstrum, De Meuse, & Futrell, 1990; Yeatts & Hyten, 1998). Moderate levels of conflict can be helpful: rivalries can get groups to work harder, arguments can encourage team members to analyse situations in a more complex manner, but higher levels of conflict can be harmful, diverting the group's attention from the task at hand so much that the work groups performance may suffer (Moreland, Levine & Wingert, 1996). Jehn (1995) examined conflict within 79 work groups and 26 management teams in a large freight transportation company. At high levels of conflict, team members became overwhelmed with information and lost sight of the group goal. Relationship conflict was damaging to satisfaction and to members' intent to remain in the group regardless of task.

Stevens and Campion (1994) identify conflict resolution as an important interpersonal skill required for teamwork. The ability to use conflict resolution in a team in a positive manner includes the ability to recognize and encourage desirable interactions, and discourage undesirable conflict (Stevens & Campion, 1994). As well, skills in dealing with conflict and in consensus building are essential for team participants who wish to assist team development (Abramson, 1989). Helping a group

come to a resolution of differences includes: (a) helping members to recognize the conflict and to express the reasoning behind conflicting opinions and alternatives, (b) utilizing decision criteria jointly agreed on, (c) identifying the acceptable and unacceptable aspects of each alternative, and (d) combining the acceptable parts of several alternatives into one solution (Abramson, 1989). Cannon-Bowers et al. (1995) proposed that conflict resolution is a team competency transportable to all forms of teams; it is both team generic and task generic.

Hypothesis 5. Conflict resolution is a competency displayed by individuals who perform effectively in teams.

Intelligence and Team Effectiveness

Measures of intelligence (*g*) or general mental ability (GMA) are accurate predictors of job performance (Ree, Earles & Teachout, 1994; Neuman & Wright, 1999). Schmidt and Hunter (1998) examined GMA tests in combination with other measures of selection. Their meta-analytic research shows that GMA and work sample test, GMA and an integrity test, and GMA and a structured interview provided the strongest validity for predicting future job performance. However, issues regarding ethnicity and racial bias have raised questions concerning the fairness in using intelligence tests for selection purposes. In 1973, in an article entitled "Testing for Competence rather than for Intelligence", McClelland suggested that competency variables could be used as predictors of job performance that are not biased by race, gender, or socio-economic factors. McClelland's (1973) research argued that competencies are better predictors of performance than intelligence or ability tests. With respect to selecting individuals for teamwork, McClelland's original idea regarding competencies may be even more imperative for individuals working in a group setting. The more one knows about a domain the better he or she should be at

accomplishing a domain-related task. At an individual level this may very well work, but within a team environment other factors largely influence performance. In a group situation it is not necessarily how much you know but perhaps how good you are at getting the information across. Group dynamics can play a large part in an individual's performance within the team and in the group's performance. Yeatts and Hyten (1998) found for instance that low-performing teams were less likely to allow the knowledge that was available to highly influence team decisions. They cite an example in a self-managed work team whereby one of the six-team members had been a supervisor prior to the team formation. It was clear that the former supervisor was highly knowledgeable in all aspects of the work relevant to the task. The team also contained a second highly knowledgeable team member. However, it appeared that many of the team's decisions ignored the advice of these two members. The team members seemed to be in constant conflict with the past supervisor. As for the other highly knowledgeable team member, the other members felt he was conceited and chose to ignore much of his advice. Consequently, although the team may have had the required knowledge to be an effective work team, they were performing below their potential due to team conflict.

Barrick, Stewart, Neubert, and Mount (1998) found that general mental ability (GMA) significantly correlated with team performance ($r = .23, p < .05$) (GMA was assessed for each individual member and a mean score of GMA was used in the correlations). The correlation, however, was not particularly strong. Furthermore, in the same study conscientiousness, agreeableness, and emotional stability were all found to be slightly more strongly correlated with team performance than general mental ability ($r = .26, r = .34, r = .24, p < .05$). Thus, although general mental ability

seems to be predictive of team performance, there appear to be other variables that may be better predictors.

Hypothesis 6. At the individual level, team member competencies will predict peer perceptions of team member performance beyond general intelligence.

Personality and Team Effectiveness

Personality traits are relatively stable characteristics of individuals that are not easily changed by training methods (Helmreich, 1984). The use of personality tests as a selection measure is experiencing popularity due to the emergence of high quality tests designed to measure personality in the normal population, and due to the emergence of a widely accepted classification system referred to as the “Big Five” (Conscientiousness, Extraversion, Neuroticism, Agreeableness, and Openness to Experience).

The relationship between personality and work teams is not certain. Researchers who have found no significant relationships have generally concluded that personality traits are too broad to be of much use in predicting team performance (Kahan, Webb, Shavelson, & Stolzenberg, 1985). Researchers who have found significant effects have typically found them after examining a large array of personality traits (Driskell, Hogan & Salas, 1987).

More recently, Kichuk and Wiesner (1998) have argued that the Big Five personality traits are important to work team performance. They concluded that the earlier research on personality and teams that did not find significant effects were hindered by making sweeping generalizations about personality traits and attempting to apply these to a wide array of work situations. More recent studies have argued that specific personality traits are related to specific types of teamwork (Kichuk &

Wiesner, 1998). When the relevant personality traits are present for a specific type task, the team's performance will be enhanced.

There is support for the measurement of personality traits as a selection tool for teams; however, both the task and type of team must be specified in order for personality to be an effective means of selection. It appears that there are often too many factors involved in group dynamics to be able to specify the ideal personality type for teams. In creative problem solving teams, a midrange of extraversion is best (Hough & Oswald, 2000), but where additive tasks are concerned teams without any introverted members are found to be higher performing teams (Barrick et al., 1998). Some studies have found a negative correlation between likeability (associated with agreeableness) and performance (Bass, 1954; Weick & Penner, 1969). However, there is a positive relationship between group performance and social insight (associated with agreeableness) (Bouchard, 1969). Overly dominant personalities may not wish to listen to reason, but at times dominant personalities are needed to help make decisions. What is the ideal personality type? There appears to be no perfect recipe for the work teams. When using personality variables to select team members one must keep in mind both the purpose and the viability of the team. For generic work teams, it appears that personality traits may not be the best method to aid in selection.

Hypothesis 7. At the individual level, team member competencies will predict peer perceptions of team member performance beyond personality.

Summary and Brief Overview of Study I and Study II

Competencies are often thought of as a group of related behaviours that are needed for successful job performance in an organization (Catano, Cronshaw, Wiesner, Hackett, Methot, 2001). When properly operationalized, competencies can

be an effective selection tool. The first study in this thesis attempts to discover the competencies displayed by individuals that function effectively in a team. Furthermore, the first study aims to create a tool — that is a, questionnaire -- that can be used to select effective team members based on these competencies. In the second study, the questionnaire is compared to measures of personality and IQ in predicting individual team performance.

STUDY I: COMPETENCY PROFILING FOR EFFECTIVE PERFORMANCE OF TEAM MEMBERS

Overview

The first phase of the study used the critical incident technique to gather the behaviours displayed by effective team members. Participants were asked to think back over the last six months and write down actual behaviours (i.e., critical incidents) they had exhibited or observed others exhibit while working in a team. The second phase involved a smaller group of subject matter experts sorting the critical incidents into similar domains, and generating a list of competency names and definitions for these domains. The third phase involved re-sorting the critical incidents back into the domains created in phase 2 in order to test the classification structure. Based on the domains retained from the critical incidents retained after the resorting, a behaviour observation scale was created in the fourth phase. The purpose of the behaviour observation scale (BOS) is to assess the competencies an individual should exhibit when performing effectively in a team.

Method

Phase I: Critical Incident Generation

Participants

Participants in the first phase of the study were 49 female and 27 male undergraduate students. Students were recruited through sign up sheets and

classroom visits. Announcements made during classroom visits and the sign-up sheets specified that in order to participate in the study students must have experienced teamwork during the last six months in order to be able to participate. Students were awarded psychology bonus points for their participation.

Procedure

Workshop. Each workshop was scheduled for 1 hour 30 min. There were a maximum of 10 individuals per session. Equipment and facilities included a room with tables and chairs for the participants, critical incident forms, pencils, and material to train the participants on how to write critical incident reports.

The purpose of the workshop was for individuals who were knowledgeable about teamwork to write instances of ineffective, average, and effective team performance. Participants were asked to think back over the last six months and relate actual behaviours they exhibited or observed others exhibit while working in a team. Participants were asked to record the circumstances leading up to the incident, what actions were taken by their team member, and the outcome of the actions. Workshop materials can be found in Appendix A.

The first 20 minutes of the workshop were used to train the participants on how to write critical incident reports. During the training, the individual conducting the workshop reviewed the goals of the workshop, explained the format of the critical incident report, and provided examples of both usable and unusable critical incident reports. Participants were encouraged to ask questions and voice concerns. After the training had been completed, the participants wrote their reports. The form that the participants use to write the incidents included prompts for the situation, the behaviour outcome, and a rating of the behaviour's effectiveness (see Appendix A).

Editing. After the critical incident reports were collected, the information was entered into a database and edited. The purpose of the editing was: (a) to place each incident in a standard, readable format, (b) to clarify some of the wording by correcting spelling, grammar and punctuation, (c) to ensure a comparable level of detail across incidents, (d) to rephrase statements as necessary to eliminate jargon that is not widely used in the SME community, and (e) to remove reports that were illegible or did not pertain to team work.

Phase II: Identifying Competency Domains

Participants

Seven psychology graduate students (four female and three male) were recruited and served as the analysts (subject matter experts) for this section. In two groups of four, the analysts sorted the critical incidents into domains. One of the analysts participated in both sorting groups. This helped maintain the standardization of the sorting procedure.

Procedure

Each critical incident report was placed on a separate sheet of paper to be sorted. The analysts reviewed the reports and placed similar reports together, according to the behaviour performed in the incident. In order to place a critical incident into a competency dimension 75 % (three out of four) of the analysts had to agree that the critical incident fit in the performance dimension and was similar in nature to the other critical incidents already placed in the category. A common set of competencies was derived through negotiations among the analysts for the different groupings of the critical incident reports. Descriptions of the competencies were written in enough detail so that other subject matter experts would categorize similar incidents into the same dimensions. The first group of four sorted half the critical

incidents into domains, and generated a list of competency names and tentative definitions for the competency domains. The second group of analysts sorted the remaining half of the competencies based upon the first group's competency domain suggestions and definitions. The second group also began new domains if they felt none of the domains pertained to a group of critical incidents. Once the second group finished sorting their critical incidents, they refined and clarified the competency definitions. Upon completion of phase II, the competency profile for team members was generated.

Phase III: Testing the Classification Structure of Performance Dimensions

Participants

Nine undergraduate psychology honours students were recruited for this section. The students were awarded \$30 for participation.

Procedure

The participants were required to sort each critical incident into one of the competency domains generated in phase II and then to rate the effectiveness level of that incident. A 7-point scale was used, where 1 = *highly ineffective* and 7 = *highly effective*.

They were to sort the incidents into the domains based upon the competency definitions.

Phase IV: Creating the Team Competency Behaviour Observation Scale

Based on the critical incidents that were retained after Phase III, a behaviour observation scale was created to assess the competencies.

Results

Phase I: Critical Incident Generation

Seventy-six undergraduate students generated a total of 413 critical incidents. After editing, 133 were omitted and 280 were retained. Critical incidents were omitted due to lack of appropriate content, incomprehensibility of the content, failure to follow the critical incident method, or failure to specify an observable behaviour.

Phase II: Identifying Competency Domains

Upon completion of phase II, nine competency domains with accompanying definitions were generated (see Table 1). A total of 32 critical incidents were sorted into the *initiative* domain, 52 into the *dedication* domain, 59 into the *cooperation* domain, 24 in the *organization* domain, 10 in the *motivation of others* domain, 23 in the *SME* domain, 32 in the *communication* domain, 9 in the *tolerance* domain and 16 in the *problem solving* domain.

Table 1

Nine Competency Domains

<u>Initiative</u> <ul style="list-style-type: none"> • Influence the flow of events instead of submitting to them (regardless of the outcome of the situation) • Undertake new activities related to the objectives with enthusiasm and without being asked • Someone who steps forward and accepts responsibilities without being prompted • A ready ability or boldness in beginning or taking on new projects
<u>Subject Matter Expert</u> <ul style="list-style-type: none"> • Possess extensive knowledge concerning a specific subject or activity. • Displays competence in a domain or field • Has the needed ability or qualifications to do something
<u>Tolerance</u> <ul style="list-style-type: none"> • The ability to endure or put up with difficulties • To display patience • Accepting of individual differences; to show consideration of others customs or beliefs even if they are different from our own
<u>Problem Solving</u> <ul style="list-style-type: none"> • Come up with efficient solutions based on proper data gathering followed by thorough and logical analysis • To solve a problem on one's own (at the individual level) for the betterment of the team or situation • To solve a problem with minimal input from others
<u>Organization</u> <ul style="list-style-type: none"> • To foresee the flow of activities and necessary resources needed to accomplish the planned project • The ability to break up complex tasks into smaller groups/tasks
<u>Communication</u> <ul style="list-style-type: none"> • The ability to clearly present a message verbally • The ability to actively listen • The ability to give constructive feedback • The ability to interpret and display appropriate non-verbal behaviour (body language)
<u>Cooperation/Collaboration</u> <ul style="list-style-type: none"> • The act of two or more people working together for a common purpose • Possess the knowledge, skill or ability to identify situations requiring participative group problem solving and to utilize the proper degree and type of participation • To collectively solve a problem • To help a team member (s) to accomplish a team goal or task
<u>Motivation of Others</u> <ul style="list-style-type: none"> • To possess a positive attitude leading towards action • To inspire team members to continue in the face of obstacles or despair • To encourage team members

Dedication

- To commit to the group or common goal
- To display a sense of responsibility to the team or team goal
- Lack of dedication: lack of ownership, lack of commitment, social loafing

Phase III: Testing the Classification Structure

The inter-rater agreement of the respondents who sorted each incident into each performance dimension was calculated. Critical incidents with an inter-rater agreement level of 66.6% were retained. Generally, 60% to 70% inter-rater agreement for critical incident retention is considered appropriate (Pukalos, 1997). With 66.6% agreement, 6 critical incidents were resorted into the initiative domain, 5 were resorted into the *subject matter expert* domain, 1 was resorted into the *tolerance* domain, 5 were resorted into the *problem solving* domain, 9 were resorted into the *organization* domain, 9 were resorted into the *communication* domain, 24 were resorted into the *cooperation/collaboration* domain, 6 were resorted into the *motivation of others* domain, and 35 were resorted into the *dedication* domain. Based upon the inter-rater agreement eight of the competencies were retained, and the tolerance competency was discarded. Only one competency was resorted into the *tolerance* domain.

Phase IV: Creation of the Team Competency Behaviour Observation Scale

Effectiveness ratings were analyzed by calculating the mean effectiveness ratings and standard deviation of each behavioural incident that was retained from Phase III. See Appendix B for the mean effectiveness ratings and standard deviations of the critical incidents. The purpose of the analysis was to facilitate the choosing of incidents that would be representative of effective, moderately effective, or ineffective team performance by selecting those incidents that have low variance in effective ratings and that have high, medium or low mean effectiveness ratings. The incidents that had the highest agreement on category placement could be considered to be most

representative of the performance dimension and thus would be used to help develop the instrument to assess team competencies. Unfortunately, upon analysis of effectiveness ratings and inter-rater agreement, the critical incidents (CI) were not representative of a range of effectiveness. More specifically, the effectiveness ratings of the CIs for a competency domain were either mostly rated as highly effective, or highly ineffective. Thus the critical incidents allocated to the competency domain could not be used as anchors on a question, because they were not representative of both effective and ineffective behaviour of the competency domains. Instead, the critical incidents were summarized into questions to create a behaviour observation scale (BOS) to assess the team competencies discovered in Phase II. See Appendix C for a copy of the BOS.

The questions generated for the BOS were representative of the critical incidents that were sorted with a 66.6% inter-rater agreement. Similar critical incidents were grouped together, and the underlying elements of the critical incidents were summarized and phrased into questions. Five questions were generated for each of the eight competency domains retained in Phase III. The themes and principles of the critical incidents, that 66.6% of the raters agreed were representative of a competency domain, were amalgamated and summarized into five questions for the corresponding competency domain. Thus all the critical incidents that had 66.6% inter-rater agreement were used to produce the competency related questions. For example, the nine critical incidents that were retained for the organization competency were summarized so that all the essential themes of these nine critical incidents were reflected in the five questions pertaining to organization in the competency BOS. The result is a 40-item questionnaire that reflects the behaviours of the critical

incidents that were retained in Phase III. (Further description of the competency BOS is found in the Measures section of Study II).

Discussion of Study I

Competency Profiling

Adaptability. Researchers list adaptability among the skill dimensions supportive of effective teamwork (Baker & Salas, 1992). Adaptability was expected to be a competency displayed by individuals who perform effectively in teams. In Study I, the gathering and sorting of critical incidents failed to identify adaptability as a competency displayed by team members. Under conditions of increasing stress, high performing teams *adapt* their: (a) decision making strategy, (b) co-ordination strategy, and (c) organizational structure, in order to maintain team performance at acceptable levels while keeping the perceived stress at tolerable levels (Serfaty & Entin, 1997). Thus the literature supports the need for adaptation but it appears that such adaptive behaviours are more likely to be displayed in stressful situations. The sample population that produced the critical incidents were undergraduate students. The majority of the critical incidents described team behaviour for class projects or group work. Thus the majority of students were not describing teamwork from highly stressful situations that perhaps a command and control team, or a long-term executive team would undergo. In order for a team to be effective and successful, its members need to be able to adapt to changes in the task environment (Serfaty & Entin, 1997), however the sample population may not necessarily have been the right target to observe such adaptive behaviours. Future research should examine teams in stressful situations that would need to adapt their decision-making and co-ordination strategies. A better sample may include members from decision-making teams such as command and control teams that respond to environmental events or to production

teams that are highly interdependent and demand coordination among numerous members to function effectively.

Communication. Communication has been cited as skill dimension associated with effective team performance (Baker & Salas, 1992; Militello, Kyne, Klein, Getchell, & Thordsen, 1999). Communication was expected to be displayed by individuals who perform effectively in teams. Study I supported this hypothesis. Critical incident sorting and testing the classification structure produced communication as a competency dimension. Researchers should continue to study communication among team members, and investigate further whether it is a separate skill that should be trained or if it is embedded within other skills that are essential to team members.

Collaboration/Cooperation. In work teams, the problem solving demands placed on team members is greater than in individual-based systems (Stevens & Campion, 1994). Thus, research has supported the notion that individual team members possess collaborative/cooperative skills (Baker & Salas, 1992; Stevens & Campion, 1994; Vinokur-Kaplan, 1995). A form of collaboration and cooperation was expected to be displayed by individuals who perform effectively in teams. Study I supported this hypothesis. The sorting of the critical incidents and testing of the classification structure produced a competency dimension that is indicative of cooperation and collaboration skills. Furthermore, problem solving and organizational skills emerged in Part I. Future research should consider if organizational and problem-solving skills are separate dimensions from cooperation and collaboration, or if within a team context they are all interdependent.

Collective Orientation. Collective oriented team members perform more effectively in teams than egocentric team players (Driskell & Salas, 1992). Collective

orientation was expected to be displayed by individuals who perform effectively in teams. The hypothesis was not supported. The critical incidents mostly listed behaviours from class project and classroom work groups, thus the teamwork cited was mostly from teams that had been working together for a fairly short period of time (i.e., one or maybe two school terms). Thus, it is plausible that the teams did have the time required to form a sense of collective orientation. Nevertheless, many project teams in organizations are short term and exist for six months or less. However, these project teams would still be expected to have more of a collective orientation than a class project team because they are members of a larger organization, and generally have more of a long-term vested interest in how well the organization performs. This kind of collective orientation would not likely exist with students working on a class project or even at a student part-time job. They are not bonded together by a larger organizational bond. Future research may want to examine when collective orientation is more evident (e.g., in high-stress situations or long term project teams) and in what type of teams.

Conflict Resolution. The ability to resolve conflict is an important interpersonal attribute for team members (Abramson, 1989; Sundtrun et al., 1990; Yeatts & Hyten, 1998). Conflict resolution was expected to be displayed by individuals who perform effectively in teams. The results failed to support this hypothesis. No clear dimension of conflict resolution appeared. Conflict between team members arises when individuals believe their goals cannot be achieved simultaneously (Levine & Moreland, 1990). The participants of the study were undergraduate students and the majority of critical incidents described class projects teamwork; and there tends to be a limited engagement for student teams. Presumably students have a clearer direction of their goals than a business team would. For

example, the team must produce a presentation on an assigned topic. In an organizational setting, a business team may have goals that are less clear. For example, they are required to produce output, but how to maximize this production may be less apparent. Furthermore, business teams may have more long-term goals and student teams may have more short-term goals. Thus due to the nature of the student teams, the need for conflict resolution may be less apparent. Future research may wish to examine the role of short term versus long-term goals and its relationship to conflict resolution. As well, although conflict resolution did not emerge as a competency dimension, communication, problem solving and cooperation and collaborations did. Perhaps the ability to resolve conflict is not necessarily a distinct competency but is a skill that is related to or is a subset of these three competencies. Future research may want to examine more closely if conflict resolution is part of a greater subset of interpersonal skills (i.e., communication and collaboration/cooperation) needed for effective teamwork.

To review, the hypothesized competencies included: adaptability, communication, collaboration and cooperation, collective orientation, and conflict resolution. Study I produced eight competency dimensions: initiative, subject matter expert, problem solving, communication, collaboration and cooperation, motivation of others, organization, and dedication.

STUDY II: VALIDATION OF THE TEAM COMPETENCY BOS AND A COMPARISON TO PERSONALITY AND IQ

Overview

The purpose of the second study is to provide a construct validation of a questionnaire developed from Study I competencies through a factor analysis, and to determine if the questionnaire can predict team performance. Study II also compared

competencies to personality and IQ. More specifically, 30 groups -- 3 to 5 participants per team -- completed the BOS, a personality questionnaire and an IQ test. This information was then used to compare the predictive validity of competencies versus that of personality and IQ. Competencies were expected to be better predictors of individual team effectiveness than IQ and personality.

Method

Participants

The participants for this study were recruited through classroom visits and by posting flyers (see Appendix D). Participants were informed that in order to participate in the study they must be part of a team, and a minimum of three people from the team must agree to participate. They were not required to complete the questionnaires at the same time as their teammates. Once it was established who the teammates were, participants were given a code and no names were attached to their responses.

Data were obtained from 102 undergraduate students (63 females and 39 males, mean age = 23.29 years, $SD = 5.29$) from Saint Mary's University. As compensation for their participation students received two bonus points for their psychology classes or an organizational behaviour class, or a monetary reward of \$10. A total of 30 groups that ranged in size from 3 to 5 members per team participated. The majority of students were full-time students (93 of 102 participants). The majority of students were in their second or third year of university studies. The majority of the participants listed commerce as their faculty. Psychology, HR management or management/accounting/marketing was most often listed as the participants' field of study. Ninety-two of the 102 participants were undergraduate students. The range of the time spent working in the teams was 1 to 8 months, with

the majority having spent one school term of 3.5 months with the team ($M = 3.81$, $SD = 1.29$). The majority of the individuals (94 participants) noted class related projects as the function of the team. See Tables 2 to 8 for frequency distributions of demographic variables.

Table 2

Student Status Frequency Table

Student Status	Frequency	Percent
Full time	93	91.2
Part time	9	8.8
Total	102	100

Table 3

Years of University Studies Frequency Table

Years of Study	Frequency	Percent
1	14	13.7
2	27	26.5
3	26	25.5
4	16	15.7
5	12	11.8
Other	7	6.9
Total	102	100.0

Table 4

Faculty of Study Frequency Table

Faculty	Frequency	Percent
Arts	38	37.3
Commerce	55	53.9
Science	8	7.8
Other	1	1.0
Total	102	100.0

Table 5

Graduate Status Frequency Table

Graduate Status	Frequency	Percent
Undergrad	92	90.2
Graduate	2	2.0
Nondegree	7	6.9
Missing	1	1.0
Total	102	100.0

Table 6

Field of Study Frequency Table

Field of Study	Frequency	Percent
Psychology	30	29.4
HR management	33	32.4
Criminology	3	2.9
Sociology	1	1.0
History	2	2.0
Management/accounting/marketing	27	26.5
Other	6	5.9
Total	102	100.0

Table 7

Time Spent Working with the Team Frequency Table

Months Spent Working with the Team	Frequency	Percent
1.00	1	1.0
1.50	1	1.0
2.00	1	1.0
2.50	1	1.0
3.00	11	10.8
3.50	72	70.6

6.00	7	6.9
7.00	1	1.0
8.00	5	4.9
Missing	2	2.0
Total	102	100.0

Table 8

Function of the Team Frequency Table

Function of the Team	Frequency	Percent
Class project	94	92.2
Work related	6	5.9
Missing	2	2
Total	102	100

Procedure

The participants completed the competency – BOS -- created in Study I. Each participant used the BOS to evaluate the team competencies of their teammates. Thus each participant completed the BOS for each of their teammates. As well, each participant completed the Wonderlic (to acquire an IQ rating) and the self-report version of the NEO-FFI (to acquire a personality rating). The students also completed a peer evaluation of each of their individual teammates to assess their summative individual team performance (SITP); this was a subjective measure of individual team performance (see Appendix E). The students were assured that their peer evaluations would remain confidential.

Measures

The participants completed the following scales:

The Team Competency Behaviour Observation Scale. The critical incident technique was used to develop the BOS for behaviours identified as important for effective individual performance within a team (Pukalos, 1997). The BOS took the form of a peer evaluation. For each behavioural incident on the scale, raters are asked to evaluate the frequency with which they have observed their team member exhibit the behaviour (Pukalos, 1997). Similar to an example cited by Pukalos (1997), the BOS anchors ranged from 1 = *almost never* to 5 = *almost always*. A 40-item scale was constructed to assess the individual competencies representative of effective performance in a team setting; 28 were positively phrased and 12 were negatively phrased. Questions were representative of the eight competencies retained in the testing of the classification structure. The competencies assessed were initiative, subject matter expert, problem solving, organization, communication, motivation of others, cooperation/collaboration, and dedication. The questions were grouped according to competency with a total of five questions per competency. The questions on the scale were derived from detailed critical incidents, which were generated during the workshops. The construction of the questionnaire items involved the review of critical incidents for each effectiveness level of the eight competency domains. A typical behaviour observation scale (BOS) would retain all of the behavioural statements generated for the scale (Pukalos, 1997). However, because in order to create a scale that could be used in a wide variety of team settings, the content of many incidents were summarized into more general questions for the measure. This procedure is similar to that of creating a Behavioural Summary Scale

(Pukalos, 1997). Cronbach alpha for the original 40- item team competency BOS was .9103. See Appendix C for a copy of the BOS.

Wonderlic Personnel Test. The Wonderlic Personnel Test (WPT) is a self-administered 12 min, 50-item omnibus test of problem solving ability (Wonderlic, 1998). It comes in 16 alternate forms and 9 different languages. The WPT has been used by businesses and government organizations for over 60 years as a screening device (Wonderlic, 1998). However, it may also be viewed as a test of general mental ability. The items of the WPT are based on the original Otis Self-Administered Test of Mental Ability (Wonderlic, 1983). Test scores on the WPT have high correlations with tests such as the Weschsler Adult Intelligence Scale (Dodrill, 1981), and the cognitive or “Aptitude G” scale of the General Aptitude Test Battery (Wonderlic, 1998). As well, it has shown consistent and fairly high reliability (e.g., split half reliability of .87) (Dodrill, 1983; McKelvie, 1989).

NEO-FFI. The NEO-FFI (Costa & McCrae, 1991) is a personality questionnaire that operationalizes the five-factor model of personality. The five-factor model of personality represents basic dimensions underlying traits found in both natural language and psychological questionnaires. The five factors are Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness. The NEO-FFI contains 60 items --12 items per domain -- and has no time limit to complete. The reliability of the NEO-FFI is fairly high. The test re-test reliability coefficients presented by the manual for the domains range from $r = .83$ for Conscientiousness to $r = .75$ for Agreeableness, and the internal consistencies range from $\alpha = .86$ for Neuroticism to $\alpha = .68$ for Agreeableness (Costa & McCrae, 1991). Some researchers argue that the NEO presents strong consensual validity between self and peer reports (Botwin, 1995), where as other researchers question the NEO

criterion related validity due to the respondents ability to fake his or her answers (Caldwell-Andrews, Baer & Berry, 2000). Cronbach alphas of the five factors for the present sample were as follows: Neuroticism $\alpha = .8501$, Extraversion $\alpha = .7261$, Openness $\alpha = .6782$, Agreeableness $\alpha = .7445$ and Conscientiousness $\alpha = .8426$.

Summative Individual Team Performance (SITP). The SITP measure was created to assess an individual member's perceived contribution to the overall effectiveness of the group. The questionnaire is a peer evaluation, whereby the participant rates the overall effectiveness his or her team member on a 7-point Likert-type scale. The questions of the SITP are intended to be broad and not task specific. They are intended to provide a summative evaluation of an individual member's performance within his or her team. The questions were adapted from a measure that was being used to measure group performance in classroom work groups. There are a total of 7 questions with slightly different rating scales. For example, the response scale for question 2 "How productive was your teammate?" is 1 = *highly unproductive* to 7 = *highly productive*. The response scale for the question 4 "How helpful was your teammate to the group project?" is 1 = *highly unhelpful* to 7 = *highly helpful*. An eighth question was placed on the questionnaire, whereby the participant was asked to rank his or her team member's overall performance. However, this question was not used in the analyses. Reliability analyses of the peer evaluation of the SITP measure produced a Cronbach alpha of .9755. Correlations of the seven items ranged from $r(102) = .7511$ to $r(102) = .9381$. See Appendix E for a copy of the SITP measure.

Results

Data Screening

Prior to analysis, the NEO scores, Wonderlic scores, team competency BOS, and overall peer performance scores were examined using various SPSS programs for accuracy of data entry, missing values, out of range values, multivariate outliers, and normality. (Multicollinearity diagnoses are discussed prior to the regression analyses.)

Analysis of the NEO and the Wonderlic scores did not detect skewness or kurtosis. Results of the evaluation of assumptions for the team competency BOS led to the transformation of the variables to reduce skewness, and to improve normality, linearity and homoscedasticity. Logarithmic transformations were applied to variables of the BOS that were extremely skewed (more than three times the standard error). The following items were negatively skewed: 3, 4, 5, 6, 7, 8, 10, 11, 13, 15, 18, 19, 20, 21, 22, 23, 24, 26, 28, 29, 30, 32, 33, 34, 35, 36, 37, 38, 39, 40. Following transformation, normality was improved. Results of the evaluation of normality, linearity and homoscedasticity of the scores from the peer evaluation of summative individual team performance (SITP) led to transformation of the scores. Logarithmic transformations were applied to the first seven questions of the SITP. Following transformations, evaluation of the skewness statistics and P-Plots of the SITP scores indicated increased normality and linearity. With the use of a $p < .001$ criterion for Mahalanobis distance no multivariate outliers among the cases were found. Missing values of individual responses to the BOS were left blank.

Examination of the standard deviations of the questions on the competency BOS indicated consistent scores. See Appendix F for mean and standard deviations of the questions on the competency BOS. Furthermore, the mean and standard

deviations of the standard deviations of the question scores' indicates good inter-rater agreement among peer raters ($M = .85$, $SD = .10$).

Factor Analysis

To discover the dimensionality of the team competency BOS, an exploratory factor analysis was conducted for the entire sample. In order to conduct the factor analysis the mean score of each question of the BOS was calculated for all participants. For example, each participant's score on question 1 is a mean score of his or her teammates peer evaluations on that question. All 40 questions were used in the original exploratory factor analysis. A principal components analysis with oblique rotation was run because the domains were expected to correlate. Principal components analyses revealed five factors, accounting for 74.4% of the variance, with eigenvalues greater than 1. Next, a principal factors extraction with oblique rotation was run because of its ability to estimate communalities in order to attempt to eliminate unique and error variance from factors (Tabachnik & Fidel, 2001). The principal factors extraction reduced the number of residuals from 121 (PCA) to 76, however the squared multiple correlations found in the diagonal of the covariance matrix still remained quite high. The principal factors analysis continued to produce five factors accounting for 74.4% of the variance, with eigenvalues greater than 1. However, this process tends to overestimate the number of factors. Moreover, analysis of the scree plot suggested a three-factor solution, which accounted for 67.9% of the variance (56.7%, 7.5%, and 3.7% for the respective factors). Thus at this point a three-factor solution was interpreted.

Items were considered to be a potential subscale member if they loaded above .39 on a single factor. Factors were interpreted as reflecting the following three domains: (a) *Motivation* (e.g., The team member encourages others in a team), (b)

Knowledge, skills and abilities (e.g., The team member is able to solve problems with minimal input from others) and (c) *Interpersonal skills* (e.g. The team member actively listens to his/her teammates and considers their opinions and ideas). A fourth factor also had clear item loadings; however, the items did not appear to have any theoretical reasoning for their grouping. The negative phrasing of the items that loaded on this fourth factor might account for their grouping. The fifth factor appeared to have cross loadings and items that did not seem to have any real theoretical reason for grouping together.

Items that were differentiated by less than .100 in terms of their loadings across factors were considered to be complex. For example, item C36 loaded .441 on factor 1 and -.366 on factor 2 and thus was considered a complex item. However, because the item appeared to reflect a motivation domain and because it loaded above .39 in factor 1, it was placed under factor 1. The same reasoning was used for other complex items. Thus if an item loaded on more than one factor, but appeared to have a theoretical association with the grouping, it was placed in the factor grouping for later analysis. See Table 9 for factor loadings.

The internal consistencies of the subscales suggested by the factor structure were good for the *Motivation* factor (10 items; $\alpha = .8175$ for factor 1), *KSA* factor (13 items; $\alpha = .8396$ for factor 3), and *Interpersonal Skills* factor (seven items; $\alpha = .9150$ for factor 5). Cronbach's alpha for all 30 items taken together was .9150. However, bivariate correlations between factors indicated a strong association between Motivation and KSA ($r = .82$), between Motivation and Interpersonal Skills ($r = .83$), and between KSA and Interpersonal Skills ($r = .78$).

Due to the highly correlated factors it appeared that there might only really be one factor to the BOS.¹ Using a principal components analysis, a one-factor solution was forced. This solution accounted for 56.7% of the variance. Examination of the component matrix revealed that 37 of the 40 items loaded above .477 on the single factor. Three items loaded at -.211, .189, and -.129. These three items were discarded for later analyses. Cronbach Alpha for the 37 items was .9250. A new score was created using the mean of the 37 items from the competency BOS measure; this score was labelled the Global Competency Index.

In summary, it appears that the factor analysis can only provide empirical support for a one-factor solution. However, it is plausible that the one factor may have the potential to develop into facets.

¹ Collinearity diagnosis was run using IQ, the Big Five personality factors and the three competency factors as independent variables. Multicollinearity among the three competency factors was evident. This further supported a one factor structure of the competency BOS.

Table 9

Factor loadings of BOS Items

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
28	.930				
27	.925				
30	.817				
29	.726				
17	.610				-.366
25	.546				-.379
4	.515				
5	.506	-.366			-.362
36	.441	-.366			
37	.420				
2	.357				
31					
33		.705			
10		.555	-.427		
14			.726		
8			.669		
15			.590		-.332
1			.566		
13			.549		-.410
3			.501		
22			.476		
9	.387		.472		
18	.349		.455		
16	.383		.445		
6			.392		
23			.391		-.333
39				-.686	
7			.427	-.538	
11			.358	-.484	
26				-.438	
40				-.425	
38		-.364		-.384	
24					-.602
21					-.528
32	.430				-.484
35					-.455
19					-.454
20					-.425
34					-.396
12			.353		-.377

Note: Italicized items loaded on the corresponding factor but were not considered as part of the factor in the final grouping, and thus were discarded in later analysis.

Correlations and Descriptive Statistics

Means and standard deviations of the study variables are presented in Table 10. Correlations among all studied variables are presented in Table 11.

Background variables. Background variables were examined in order to determine if it was necessary to control for their influence in the regression analyses.

Gender differences were found on numerous variables. Men and women differed on years of university study ($t(100) = -3.809, p < .001$; men: $M = 2.4, SD = .99$; women: $M = 3.46, SD = 1.53$), Agreeableness ($t(100) = -4.10, p < .001$; men: $M = 3.45, SD = .54$; women: $M = 3.84, SD = .42$), and Conscientiousness ($t(100) = -3.07, p < .001$; men: $M = 3.75, SD = .59$; women: $M = 4.09, SD = .50$). As well, gender differences were found on the global competency index ($t(100) = -2.66, p < .001$; men: $M = 1.20, SD = .22$; women: $M = 1.32, SD = .23$), and the SITP score ($t(100) = -2.57, p < .05$; men: $M = .44, SD = .14$; women: $M = .51, SD = .14$) (Note for the global competency index and the SIPT t-scores, means and SDs reflect transformed data).

Differences were found between full-time and part-time students. Full-time and part-time students differed in age ($t(99) = -3.05, p < .05$; full-time: $M = 22.80, SD = 4.5$; part-time: $M = 28.22, SD = 9.4$), Neuroticism ($t(100) = -1.99, p < .05$; full-time: $M = 2.48, SD = .65$; part-time: $M = 2.94, SD = .81$), Extraversion ($t(100) = 3.02, p < .01$; full-time: $M = 3.76, SD = .46$; part-time: $M = 3.29, SD = .37$), and Openness ($t(100) = 2.08, p < .05$; full-time: $M = 3.27, SD = .51$; part-time: $M = 2.90, SD = .50$).

Differences were also found on function of the team and age ($t(97) = 2.41, p < .05$; class project: $M = 23.63, SD = 5.36$; work related: $M = 18.33, SD = .52$).

Significant correlations were also found between age and numerous background variables (See Table 11).

ANOVAs were run for faculty, undergraduate/graduate, and field of study using the Global Competency Index and SITP as dependent variables. There were no significant differences.

NEO-FFFI and Wonderlic. A significant correlation was found between “years of university studies” and Conscientiousness ($r(102) = .205, p < .05$). A significant correlation was found between Conscientiousness and the Global Competency Index ($r(102) = .336, p < .01$), and between Conscientiousness and SITP ($r(102) = .384, p < .01$). As well, numerous correlations were found among the Big Five personality factors (See Table 11 for scores). Wonderlic scores were not significantly correlated with any other variable.

Global Competency Index and SITP. A significant correlation was also found between the Global Competency Index and the SITP ($r(102) = .906, p < .01$).

Table 10

Means and Standard Deviations of Studied Variables

Variable	<i>M</i>	<i>SD</i>
<u>Background Variables</u>		
1. Age	23.28	5.29
2. Time spent working with the team	3.81 months	1.29
3. Wonderlic scores	24.67	5.04
<u>Big Five Personality Variables</u>		
4. Neuroticism	2.53	.67
5. Extraversion	3.71	.47
6. Openness	3.24	.51
7. Agreeableness	3.69	.51
8. Conscientiousness	3.97	.56
<u>SITP</u>		
9. Before transformation	5.48	1.3
10. After transformation	.48	.14
<u>Global Competency Index</u>		
11. Before transformation	3.90	.69
12. After transformation	1.27	.23

Table 11

Correlations among studied variables

	1	2	3	4	5	6	7	8	9
1. Age	--	.116	.293**	.294**	.140	.043	.108	-.243*	-.238*
2. Gender		--	-.040	.356**	-.030	.158	-.169	.101	.111
3. Full time/ part time			--	.035	.148	.038	-.086	-.076	-.079
4. Years of studies				--	.295**	.369**	-.152	-.414**	-.358**
5. Faculty					--	.154	.300**	-.197*	-.244*
6. Undergrad/ graduate						--	-.179	-.149	-.078
7. Field of Study							--	-.057	-.119
8. Months with the team								--	.794**
9. Function of the team									--
	10	11	12	13	14	15	16	17	
1. Age	.068	-.115	-.058	.011	.086	.209*	.009	.061	
2. Gender	-.044	.151	-.086	.011	.380**	.293**	.257**	.249*	
3. Full time/ part time	.055	.195*	-.288**	-.204*	-.051	-.150	-.114	-.163	
4. years of studies	-.097	-.081	-.163	-.035	.086	.205	.179*	.104	
5. Faculty	.058	-.178	-.168	-.052	-.058	.002	-.110	-.167	
6. Undergrad/ graduate	.016	-.078	-.149	-.141	.102	.060	.135	.161	
7. Field of Study	.057	-.271**	-.019	.028	-.009	.122	-.291**	-.219*	
8. Months with the team	.017	.013	.112	.093	.086	-.082	.136	.103	
9. Function of the team	-.017	-.017	.082	.146	.005	-.126	.105	.045	
10. Wonderlic	--	-.073	-.071	-.041	.041	-.125	.102	.160	
11. Neuroticism		--	-.309**	.023	-.140	-.405**	-.162	-.171	
12. Extraversion			--	.131	.213*	.201*	.002	-.016	
13. Openness				--	-.051	-.123	-.035	-.017	
14. Agreeableness					--	.232*	.132	.156	
15. Conscientiousness						--	.336**	.384**	
16. Global Competency Index							--	.906**	
17. SITP								--	

** . Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

Regression: Summative Individual Team Performance as Criterion

Hierarchical regression was performed to determine if individual team member competencies would predict peer perceptions of team member performance beyond personality and intelligence (see Table 12). The background variables were entered at Step 1, Wonderlic Scores (IQ) at Step 2, the Big Five personality dimensions at Step 3, and the Global Competency Index at Step 4.

Prior to regression analysis a collinearity diagnosis was run using IQ, the Big Five personality factors and the Global Competency Index as independent variables. None of the tolerances approached zero, and collinearity diagnoses indicate no cause for concern. With the use of a $p < .001$ criterion for Mahalanobis distance no multivariate outliers among the cases were found.

In the first step, summative individual team performance (SITP) was regressed onto the background variables at Step 1 ($R^2 = .11$, $F(6,92) = 1.91$, $p > .05$) and IQ at Step 2 ($R^2 = .14$, $R^2_{adjusted} = .08$, $F(7, 91) = 2.15$, $p < .05$). IQ did not significantly increase the explained variance ($\Delta R^2 = .03$), $p > .05$). However IQ did significantly predict individual team performance. At Step 3, The Big Five personality dimensions were added to the prediction of individual team performance ($\Delta R^2 = .11$, $F_{change}(5,86) = 2.62$, $p < .05$; $R^2 = .26$, $R^2_{adjusted} = .15$, $F(12,86) = 2.46$, $p < .01$). The Big Five personality dimensions accounted for an additional 11% of the variance in individual team performance ($p < .01$). Conscientiousness ($\beta = .37$, $p < .01$) emerged as a unique predictor. At Step 4, the global competency index was added to the regression analysis ($\Delta R^2 = .61$, $F_{change}(1,85) = 269.68$, $p < .001$; $R^2 = .86$,

$R^2_{adjusted} = .84$, $F(13,85) = 40.418$, $p < .001$). Competencies accounted for an additional 61% of the variance in individual team performance ($p < .001$).²

Table 12

Hierarchical Regression SITP as Criterion

	β	Total R^2	R^2 Change
Step 1: Background variables			
Age	.09	.11	
Gender	.21		
Student status	-.18		
Years of study	.06		
Time spent team	.20		
Function of team	-.11		
Step 2: IQ	.18	.14*	.03
Step 3: Personality		.26**	.11*
Neuroticism	-.02		
Extraversion	-.132		
Openness	.01		
Agreeableness	.02		
Conscientiousness	.37**		
Step 4: Global Competency Index	.89**	.86**	.41**

* $p < .05$ ** $p < .01$; $n = 98$

² Regression analysis using the three competencies (KSA, Motivation of Others and Interpersonal Skills) at step 4 was also run ($\Delta R^2 = .61$, $F_{change}(3,83) = 118.46$, $p < .001$; $R^2 = .86$, $R^2_{adjusted} = .83$, $F(15,83) = 33.70$, $p < .001$). Results were found to be congruent to the analysis using the Global Competency Index.

Regression: Global Competency Index as Criterion

Due to the large amount of variance accounted for by the competency BOS, a regression analysis using the Global Competency Index as criterion was run. If the new measure could be used as a criterion, then it could possibly be used as a form of performance appraisal or a selection measure. Instead of being used as a predictor, the measure could also be used as a tool to evaluate current or possible future employees. The background variables were entered at Step 1, the Wonderlic scores were entered at Step 2 and the Big Five personality factors were entered at Step 3 (see Table 13).

The global competency index was regressed onto the background variables at Step 1 ($R^2 = .11$, $F(6,92) = 1.93$, $p > .05$) and IQ was added to the regression equation at Step 2 ($\Delta R^2 = .02$, $F_{\text{change}}(1, 91) = 2.03$, $p > .05$; $R^2 = .13$, $R^2_{\text{adjusted}} = .07$, $F(7, 91) = 1.97$, $p > .05$). Neither IQ nor the Wonderlic significantly predicted scores on the Global Competency Factor. At Step 3, The Big Five personality dimensions were added to the regression equation and were found to significantly predict the team members' competency factor scores ($\Delta R^2 = .10$, $F_{\text{change}}(5, 86) = 2.22$, $p > .05$; $R^2 = .23$, $R^2_{\text{adjusted}} = .12$, $F(12, 86) = 2.15$, $p < .05$). Conscientiousness ($\beta = .36$, $p < .01$) was a unique predictor.

Table 13

Hierarchical Regression with Global Competency Index as Criterion

	β	Total R^2	R^2 Change
Step 1: Nuisance variables			
Age	.01	.11	.11
Gender	.15		
Student status	-.10		
Years of study	.20		
Time spent with team	.21		
Function of team	-.01		
Step 2: IQ	.14	.13	.02
Step 3: Personality		.23*	.10
Neuroticism	-.01		
Extraversion	-.06		
Openness	-.01		
Agreeableness	-.02		
Conscientiousness	.36**		

* $p < .05$, ** $p < .01$; $n = 98$

Discussion – Study II

Hypothesized Competencies

The factor analysis produced one Global Competency factor. Originally it was hypothesized that adaptability, communication, collaboration/cooperation, collective orientation, and conflict resolution were competencies displayed by an individual who performs effectively in teams. The factor analysis failed to support the hypothesized competencies. Furthermore, the competency BOS was created based on eight factors: initiative, subject matter expertise, problem solving, communication, collaboration/cooperation, motivation of others, organization and dedication. The factor analysis failed to support the differentiation of the eight factors; one global competency factor was produced.

At first glance it appeared that the factor analysis might produce three factors. However, high correlations between factors and low amounts of variance accounted for by the second and third factor indicated that the BOS was composed of only one factor. However, there are substantial issues as to why the factors failed to reproduce.

Foremost, there may be an issue of interdependence. The intrinsically social nature of the group itself may be contributing to the peer rating scores. For example, although each participant was assured confidentiality when completing the questionnaires this does not assure that his or her peer ratings are not influenced by the group's perceptions and attitudes. It is plausible that the group members may have discussed their attitudes, and they may influence one another so that within a group all members may share the same consensual opinion (Kashy & Kenny, 1997). All scores calculated for the competency BOS questionnaire were calculated based on peer ratings. This is typically referred to as a round robin design whereby every member of the group interacts with or rates every other individual in the group (Kashy

& Kenny, 1997). Thus each person's score is an aggregate of his or her team member's peer ratings. Although the round-round design may provide a more accurate assessment of individual's performance than a self-appraisal, the round robin design is not without its faults (Kashy & Kenny, 1997). According to Kenny and his colleagues, the Social Relations Model (SRM), provides a general framework from which both social behaviour and interpersonal perception can be studied (Kashy & Kenny, 1997; Kenny, 1994; Kenny & LaVoie, 1984). In the SRM, the outcome score is composed of the group mean, the actor effect, the partner effect and the relationship effect (Kashy & Kenny, 1997). The group mean reflects the average level of outcome score for the group, for example the general level of communication as a whole (some groups may be more communicative than others). The actor effect is the degree to which an individual provides consistent scores on the outcome variable across multiple dyads. The partner effect is the degree to which others behave in consistent ways on the outcome measure when interacting with a particular partner. The relationship effect is at the dyad level, and it reflects the unique combination of two individuals after removing their individual level tendencies (Kashy & Kenny, 1997). As can be seen by these different components, the outcome competency score of the individual had numerous components. For example, according to the actor effect one may tend to rate all partners as highly communicative. Thus an individual's final score may be influenced by variance due to one of these components in the SRM model. Variance due to one effect in particular (i.e., group, partner, actor or relationship, may be affecting the outcome scores within a team). Due to the nature in which the outcome score were collected -- the round robin design -- it is possible the ratings of the competency questions were influenced by variance due to group, partner, actor or relationship effects thus making it difficult for distinguishable

competency domains to emerge from the BOS questions. Future research using peer ratings should consider multi-level modeling. Multi-level modeling provides a method for estimating interactions between variables that are measured at different levels of analysis. Multi-level modeling would allow the researcher to examine the unique effects that occur when two particular individuals interact with or rate one another from the two individuals' general tendencies.

Another possible reason the factors did not emerge is due to the highly conceptually related nature of the proposed factors. For example, communication, collaboration/cooperation, and conflict resolution have previously been listed as subcategories of the larger category of Interpersonal Skills (Stevens & Campion, 1994). Furthermore, it would seem reasonable that one would not be able to collaborate or resolve conflict without being able to communicate. Thus although the different hypothesized competencies, as well as the competencies that emerged from Study I, may be important for an individual to perform effectively in a team they are not necessarily distinct enough to produce separate competency factors.

A question that the results of the factor analysis raises is can a person distinguish between competencies? It may be very plausible that all eight competency domains are needed for effective individual team member performance, but when completing the questionnaire participants are not able to distinguish the fine elements that differentiate the questions. Those trained in a related field such as organizational psychology or human resource management may be able to discriminate between essential elements of a competency such as communication and cooperation, but to the average person who is not trained to differentiate such fine details the difference may not be as clear. Thus how does one assess competencies if not through a questionnaire? Future may want to explore other methods for assessing

competencies, in of lieu straightforward questionnaires. As well, comparative studies using mono-trait and multi-method forms of assessment may help to assess if there exists distinguishable competencies representative of effective performance.

Demographic Variables and Team Effectiveness

Gender differences were not found to be predictive of individual team effectiveness in the regression analysis, however t-tests revealed that women scored significantly higher than men on both the Global Competency Index and the SITP scores. This finding is consistent with gender differences found in interpersonal behaviour. For example, women have been found to be more communal than men (Moskowitz, Suh, & Desaulniers, 1994). Communion is often expressed in strivings for intimacy, union, and solidarity with a social or spiritual entity, and communality would be partly reflected in frequent agreeable behaviours and infrequent quarrelsome behaviours (Wiggins, 1992). As well, women were found to be more conscientious than men. Conscientiousness was found to be a unique predictor of team individual team effectiveness in the regression analyses. These findings may have significant implications. Does this mean that women are better suited for a team environment than men? Future research should examine more closely the selection implications of gender differences in team environments. Correlational analyses also revealed age and years of study to be positively associated with conscientiousness. Future research may wish to examine the implications that age and years of study have on conscientiousness in a team context.

Intelligence and Team Effectiveness

It has been argued that competencies are better predictors of performance than intelligence (McClelland, 1973). It was hypothesized that at the individual level, team member competencies would predict peer perceptions of team member

performance beyond general intelligence. This hypothesis was supported. Although IQ did predict team performance, results of the regression analysis showed that the Global Competency Index accounted for an additional 72% of the variance above and beyond intelligence. Thus it would appear that the Global Competency Index is a better predictor of peer perceptions of performance than intelligence scores.

An analysis using the Global Competency as a criterion was also run. IQ did not significantly predict the participants' scores on the global competency factor. Although some of the questions of the competency BOS were designed to reflect cognitive domains such as subject matter expertise and problem solving ability, it appears that intelligence scores were not predictive of the BOS measure. The majority of questions of in the BOS were of an interpersonal nature; this is may be why IQ did not predict the BOS measure.

Although data screening analysis found that the intelligence scores were within normal ranges, some of the scores were rather low. For example, there were two scores of 14, one of 15 and three of 16. The Wonderlic test is designed to accurately measure general cognitive ability, however there were times when the accuracy of the participants score may have been questionable. For example, if the participant used unwise test-taking strategies (e.g., guessing or skipping around), or if the participant did not necessarily take the test very seriously and put a good effort in. Future research should consider giving the participant an incentive to do their best when taking the IQ test.

Personality and Team Effectiveness

The notion that personality can influence team performance has appeared repeatedly in the group dynamics literature. For example, in a discussion of work groups and productivity, Ridgeway (1983) suggested that effectiveness “emerges

from the interaction of skills and personalities of the members, the nature of the task, the groups' structure and norms, and the influence of the outside environment" (p. 281). However, there appears to be no perfect recipe as to what personality type is the best for work teams, different types of teams benefit from different types of personalities. I hypothesized that at the individual level, team member competencies would predict peer perceptions of team member performance beyond personality. This hypothesis was supported. The Big Five personality dimensions accounted for 26% of the variance of individual team performance, but the Global Competency factor accounted for an additional 61% of the variance. Thus although it appears that personality is predictive of peer perceptions of individual team performance, competencies were found to be a better predictor.

Some interesting findings emerged concerning the personality variables and individual performance. Personality was a better predictor of performance than IQ. Thus it would appear that the ability to interact with your teammates might be more important than intellectual abilities in a team setting. However, there may have been a restriction of range on the IQ variable due to the nature of the sample population. The sample used was university students, so presumably there would be a restriction of range resulting from the university selection process. In a real working environment, the restriction of range may not exist or there may be less of a restriction. Future research might consider using work populations with a larger range of IQ.

Conscientiousness was positively related to individual team performance. This is congruent with previous research that has found conscientiousness to be positively associated with team performance (Barrick et al., 1998; Kickul & Neuman, 2000).

An analysis using the Global Competency Factor as a criterion and the personality dimensions as predictors was also performed. The Big Five personality dimension significantly predicted the Global Competency Factor. Specifically, conscientiousness was predictive of competency scores (from the competency BOS measure). Conscientiousness has been positively related to job performance measures (Barrick & Mount, 1991; Barrick et al. 1998). Furthermore, conscientiousness team members have been described as influencing team performance through the effort they apply to their work group in the form of hard work, perseverance, and an achievement orientation (Yeatts & Hyten, 1998). In Study II, Conscientiousness was positively associated with the participant's scores on the competency BOS measure. This finding not only supports the established link between team performance and conscientiousness, but it also provides support that the BOS is measuring individual team performance due to its association with Conscientiousness.

General Discussion

This thesis sought to discover the competencies associated with effective performance of individual team members. More specifically, I attempted to profile the transportable competencies that would be utilized to select individuals when trying to create an effective team. Critical incidents were employed to pinpoint the behaviours of effective and ineffective team members, and these behaviours were then transformed into a measure that could be used in assessment and selection. Individuals of existing teams completed this newly formed competency-based questionnaire, as well as personality and IQ measures. Results of these measures were compared, and predictive validity of team performance was assessed.

Summary of Results

Following literature reviews, hypotheses concerning the competencies necessary for effective teamwork were made. Forms of adaptability, communication, collaboration/cooperation, collective orientation, and conflict resolution were hypothesized to be important competencies for team members. Study I revealed eight competencies to be descriptive of the behaviours of effective and ineffective individuals in teams. These competencies were: initiative, subject matter expert, problem solving, organization, communication, cooperation/collaboration, motivation of others and dedication. Thus both communication and collaboration/cooperation appear to confirm expectations.

Study II re-examined the competencies of effective team members by factor analyzing the competency questionnaire based on the behaviours that emerged via the critical incident technique from Study I and organized into the eight competencies. Factor analysis of the competency questionnaire revealed one global competency factor. See Figure 1 below for competency development process. However, the factor analysis did suggest that there might be possibilities of developing subscales to the measure. Definitions of these competency subscales can be found in Table 14.

Figure 1. Competency Development

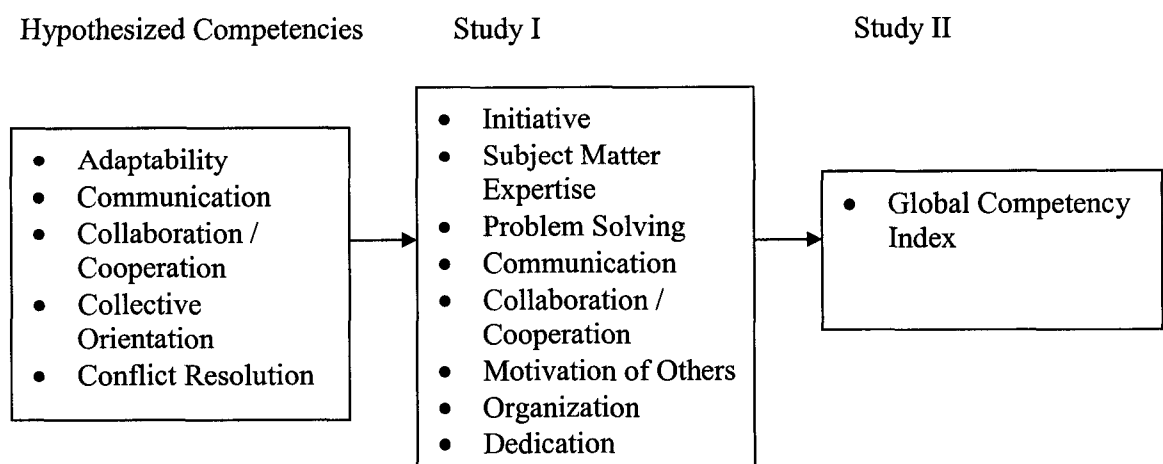


Table 14

*Definitions of Three Subscales***KSA domain**

The knowledge skills and abilities required to effectively complete the team related task. It is a cognitive oriented domain and it includes subject matter expertise, and problem solving abilities.

Interpersonal Skills domain

The ability to optimize a healthy working relationship with his or her team members. This is operationalized through effective communication, cooperation and collaboration.

Motivation

To possess a positive attitude that encourages and/or leads toward action. This includes displaying a sense of responsibility and dedication, as well as taking initiative.

Study II also included examination of personality and IQ measures. It was hypothesized that team member competencies would predict peer perceptions of team member performance beyond personality and intelligence. This was confirmed. The Global Competency Index was a better predictor of effective performance of team members than both personality and IQ. Personality was a better predictor of performance than IQ. As well, personality was found to be predictive of the Global Competency Index.

Synopsis

This thesis attempted to pinpoint the competencies that are reflective of an individual who performs effectively in teams. Although the second study did not validate a competency profile for effective team members, this does not take away from the value gained from the competency BOS. The first study enabled the creation of a measure that can be used to evaluate individual performance of team members. The results of the second study provided support that the competency BOS is not only predictive of team performance, but is also a better predictor than

personality and IQ measures. Thus the competency BOS has the potential for great applicability such as selection and performance appraisals.

Furthermore, although the factor analysis of the competency BOS measure did not produce distinct factors this does not mean that the Global Competency Index is not composed of numerous elements. Analysis of the critical incidents produced different domains. Thus although the second study did not provide construct validity of these domains as distinct elements, it does not mean that the eight domains are not all important features of effective teamwork. The second study simply suggests that the elements may be highly intertwined. The Global Competency Factor is composed of questions that reflect the eight elements from Study I: initiative, subject matter expert, problem solving, organization, communication, cooperation/collaboration, motivation of others and dedication. Furthermore, the factor analysis did indicate the possibility of three subscales: KSA, Interpersonal Skills and Motivation. Improvements made to the questions of the competency BOS measure, as well as the application of measure to different types of work groups may increase the emergence of more distinct subscales. Additional research is required to distinguish the best items from the subscales and create a measure that assesses more distinct components of group effectiveness.

Implications and Future Research

The intention of this research was to discover competencies that are essential to all types of work groups: transportable team competencies. It is possible that the characteristics examined in this study are only important and related to the performance of a student type work group operating in a university setting; however, one should not assume that the groups studied in this research share no characteristics with other groups performing different types of tasks. Future research should consider

the competencies required in different work groups and different settings, and compare and examine the common competencies across different types of work groups. Is there a general group of competencies that all effective team members share? And can these competencies be used as a general template in selecting individuals for all forms of teams?

Furthermore, the transportability of all elements related to a competency may need to be questioned. Although there may be consensus on the general aspect of communication, the fine elements of such a competency may differ within different hierarchical levels of an organization or across organizations in general. Would the communication elements required of employees in a front line manufacturing team be the same as management team? Perhaps when building competency models, researchers may wish to consider that certain foundational elements of competencies are stable and can remain the same across a variety of jobs, but certain competency elements may need additional stipulations or modifications due the fine details associated with organizational, hierarchical, or task specific requirements of a job. In other words, it is the foundation of certain competencies that is generic and transportable. Future research should examine if certain elements of the same competencies remain consistent across jobs.

The participants in the study were University students, with the majority of students between the ages of 19 and 23. It would be interesting to discover if the competencies required for the effective teamwork would be the same for different age groups. For example, would older team members be less open to change but perhaps more patient with team members? Furthermore, it would be interesting to look at the effect of age on teamwork. Do teams benefit from age diversity? Would a team composed of individuals of different ages outperform a team of solely younger or

solely older adults? The sample population was neither large enough nor representative enough of different age groups to examine such questions. Future research may wish to compare the competencies required from different age groups for effective teamwork.

In a constantly changing work environment, organizations need to be able to adapt quickly to in order to remains competitive. Teams and the components of teamwork may change over time (Baker & Salas, 1992), so that the importance of different skills may evolve as the team matures. Teams should be observed at various points of their development and in a variety of situations in order to differentiate the team competencies that are more constant across times and situations from those that are situationally determined and/or influenced by maturation.

The BOS checklist is a means of evaluating the competency elements possessed by team members. Situational interviews and behaviour description interviews have been successful means of selecting candidates for organizations. In a situational interview, hypothetical situations are described and applicants are asked to describe what they would do (Catano et al., 2001). In a behaviour description interview, the applicant is asked to describe what he or she did in a given situation in the past (Catano et al., 2001). Future research may also examine the use of situational and behaviour description interviews in measurement of teamwork competencies.

One important implication of the contribution of competencies above and beyond personality measures (e.g., the NEO) and general mental ability measures (e.g., the Wonderlic) is that numerous competencies can be trained or improved. When selecting candidates for a job, HR personnel generally employ people who have the right technical skills for the job. Training and coaching is then used to get people to work together effectively. Teams influence the realization of knowledge, skills

and abilities through instruction, feedback, and modelling on the job (Hackman, 1992). Thus it leads one to question the use of work experience to further competency development? There has been some evidence that the proactive use of work experience through job rotation has been related to the acquisition of interpersonal and communication skills (Campion, Cheraskin, & Stevens, 1994). Formal training and coaching can increase competency levels; however, perhaps the acquisition of team competencies can be trained without formal off-the-job programs. Future research is needed to examine the role of work experience in developing team competencies.

Advocates of competency-based management often support the ability to train desirable employee competencies. However, recent research findings suggest that not all competencies can be fully trained. In a study conducted by Hun and Baruch (2003), the impact of interpersonal skills training was modest. It was suggested that refinement rather than radical change could be accomplished. It appears some competencies may be more trainable than others. This has interesting implications. Organizations may need to consider when selecting employees or forming teams that some competencies may need to be selected for instead of trained. Future research should examine more carefully which competencies are more trainable than others, and what elements or behaviours associated with these competencies enables them to be more easily trained.

If organizations with teams wish to stress the importance of team competencies to their employees, performance appraisal systems should be modified to reflect work group competencies. Including teamwork competencies in performance appraisal systems raises several issues. First, how much of a contribution do team competencies make to the appraisal of the employee? Are team

competencies a dimension onto themselves, or should they be assessed as part of the employee's overall performance? Second, what is the optimal method to measure teamwork performance of individuals for an appraisal system? Are supervisors the best source of judgement, or should team members be peer appraised? Should team members be assessed individually or should teamwork performance be linked to the performance of the entire team? If organizations want to motivate their employees to improve their team competencies, it would be fitting to include team competencies in their appraisal systems. Future research needs to examine and clarify the role of team competencies in performance appraisals.

Incorporating teamwork competencies in performance appraisal systems leads to discussion of the role of teamwork competencies in compensation. If organizations increase the competency requirements of jobs, they should be reflected in job evaluation and compensation systems. Incorporating team competencies as a determinant of compensation raises a number of research issues. How much should teamwork competencies be worth? Should they be worth more in some positions or in some companies than in others? If team based competencies are included in compensation systems, will there be an increase in competition for these competencies as more companies implement teamwork programs? If companies increase their requirements for teamwork competencies, compensation systems may need to reflect this increased demand. However, before organizations start to "pay for competencies", numerous issues need to be clarified.

Group members seldom contribute equally to composition effects. Factors such as status, seniority, and visibility (the extent to which someone's characteristics are noticed by group members) can affect one's contributions within a group. This raises the issue of whether members need to have the same team competencies, or

whether their roles within the team affect their competency requirements. For example, perhaps only one member of the team needs to have conflict resolution skills, while another team member should have motivational skills. The role of team members and their relation to team competencies and collective outcomes needs to be clarified to optimize the performance of teams.

Creating the BOS was the first step of the process in the construction of a valid measure that can be used to select effective team members. The next step would be to further refine the questionnaire and administer it in another setting to prove convergent and discriminant validity. Subsequent applications of this instrument can assist in understanding some of the issues that affect group performance.

Although the study concentrated on the effectiveness factors that are primarily internal to the work group, issues external to the work group are also related to effectiveness. Much of the literature on work groups has concentrated on the factors internal to the group and neglects the importance explicit organizational context and the alignment of the group with the organization's stated goals (Hyatt & Rudy, 1997). Future studies should recognize the importance of external factors such as work group support, team resources, process orientation and goal orientation.

Limitations

Interesting findings regarding teamwork were revealed in this study, but there are a few limitations that should be considered. In the first part of the study, a student population was used to complete critical incidents. Although the students were asked to report teamwork behaviour they had experienced over the last six months, the precision of their reports is disputable. The critical incidents did not reflect the detail required to identify the fine-grained behaviours of conflict resolution or adaptability. Furthermore, the quality of the teamwork experienced and reported was questionable.

For example, students cited informal teamwork such as planning a party or even stealing a motorcycle! The editor attempted to edit and clarify irrelevant samples of teamwork; however, reports from working groups from organizations may have provided better examples of group work. Further research should be conducted whereby critical incidents are collected from various types of work groups in diverse settings in order to optimize the variety of the behaviours reported. Future studies should try to collect information from team members whose quality and quantity of teamwork can be assured.

Of primary concern in the second study is the sample size. Although a total of 102 individuals participated in Study II, the number of teams was only 30. A larger sample size composed of a greater number of teams would have provided stronger statistical power. In testing individual predictors, a general rule of thumb to be used to optimize sample size is $N > 104 + m$ where m is the numbers of independent variables (Tabachnik & Fidel, 2001). Thus although unique predictors were examined, one must consider the plausibility of their inaccuracy.

As well, the majority of teams only spent one semester or total of 3 to 3.5 months working together as a team. Had the team members spent a longer period of time working together as a team the relationships among team members may have been stronger. This would have perhaps given them more accurate perceptions of team members' abilities.

The effectiveness of individual team performance was based on a questionnaire created for this study (SITP). While analysis provided support for the reliability of the questionnaire one must question its accuracy and validity since it had never been used before. Furthermore, although the competency BOS was found to be predictive of SITP scores, it is very plausible that the variance scores were inflated

because scores of both the predictor and the criterion in the regression analysis were collected in the same manner (using round robin design of team member peer ratings). Consequently, method variance may account for inflated R^2 scores. Ideally, effectiveness of individual performance would have been assessed by numerous methods. Final assessment of individual team performance should comprise both subjective and objective measures. For example, a 360-degree performance appraisal would provide a good form of subject evaluation. Products or services (outputs) produced would provide a good objective evaluation.

Summary and Conclusions

Staffing a team that will work well together and that will continue to produce lucrative output for long periods of time is much more complicated than simply selecting based on a few competencies. When creating a team one cannot necessarily predict all the obstacles and processes that a team will undergo. Team-relevant characteristics such as team structures, changing task demands, policies, contexts, life cycles, and management needs will all affect team performance (Klimoski & Jones, 1995). However, one can attempt to increase the probabilities of long-term success by selecting team members with team supportive competencies. As previously discussed in the Introduction, competencies refer to knowledge, skills, abilities and other qualities that are required for successful job performance, competencies are observable and measurable, and competencies can be used to distinguish superior from less superior employees (Catano, 1998). In the present study, a Global Competency Factor emerged that is representative of individuals who are effective in teams. This factor is reflective of numerous elements such as: initiative, subject matter expert, problem solving, organization, communication, cooperation/collaboration, motivation of others, and dedication. By selecting and

training individuals with these competency-like elements, organizations can get better results faster. High performance teaming is cost effective. Furthermore, the present study demonstrated that the Global Competency factor is a better predictor of team performance than general mental ability and personality dimensions. This is good news for organizations, because numerous competencies can be trained or further improved, and personality dimensions and IQ cannot.

Due to the ubiquity of teams in organizations today, many are formed without much thought put into maximizing group dynamics and teamwork. Given organizations' increasing reliance on teams, it is critical that a clearer understanding of the factors impacting team effectiveness be defined. It is my hope that this study takes us closer to understanding the essential elements of effective teamwork, and motivates others to continue to investigate ways to maximize group performance.

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Appendix A

Critical Incident Workshop Materials

Critical Incident Workshop

1. Purpose of the Workshop

“The purpose of this workshop is to gain knowledge about effective and ineffective teamwork behaviours.

This information will be used in the identification of beneficial teamwork qualities.”

2. What is needed from participants

“I need you to think back over the last six months and write about behaviours and incidents that you can recall that directly relates teamwork behaviour that you have experienced.

The critical incident that you will write down will consist of the circumstances leading up to the incident, what actions were taken by your team mate, and the outcome of the actions.”

3. The Goals of this Workshop

“The goals of this workshop are to produce as many thorough critical incident’s as possible in the hour and a half time slot.”

4. Run through a CIT with the group

When giving examples to the participants about critical incidents, try not to give examples of specific teamwork behaviours. This can cause students to get into a mental rut and have a hard time thinking more broadly about teaching (e.g. all they are able to form examples of is classroom behaviour b/c that was what your example was about).

Overhead – display tips

Read through tips with the students:

“A. Tips for writing CI Reports:

1) Concisely describe the situation, the action taken, and the outcome. Carefully decide what information is relevant to each event.

2) Describe what your teammate did (or failed to do) in that specific situation. Do not describe ‘types of things people do’ or general traits of effective or ineffective workers. The emphasis should be on what was observed, not on interpretation of the action.

Example:

Wrong – The team member displayed good communication skills.

Right – The team member listened to my concerns and responded with good suggestions for improvement.

3) Focus on the actions of a single person rather than those of a team.

4) Write events in the third person (he or she) and do not use personally identifying information. Use terms such as “the team member” and “the student”. Even if you relate events that are things you did please write them in the third person.

5) Write about actions you have taken or the actions of others that you have personally observed, not situations reported to you by someone else, because your recollection of these events will be the most vivid and accurate.”

B. Overhead - Show a copy of the form

C. Overhead – Show copy of a Poor Critical Incident Report

Read though CI with students and then point out its shortcomings:

“This Critical Incident report is not useful because of the following reasons:

- i) It is written in the passive voice.
- ii) It is unclear who performed the behaviours.
- iii) It does not refer to the actions of a single person.
- iv) An action is not clearly presented; therefore, it is unclear what led to the outcome.”

D. Overhead – Show copy of a good Critical Incident Report

Once again, read through CI with students and point out why it is improved.

“This Critical Incident report is much better because:

- i) It discusses a specific incident in an action-oriented manner.
- ii) It discusses a complete situation, action, and result.
- iii) It refers to the behavior of one individual rather than a team.”

5. Conclude and initiate task

Ask the students if they have any questions. Distribute the critical incident forms and begin.

6. If individuals get stuck

These are some prompts you can use in case the students get stuck:

- i) Think of a teammate that you may have admired. Can you recall an incident that convinced you that the person was an outstanding performer?
- ii) Think back over the last 6 months, can you think of a time when your team member was particularly effective? What did they do that made them effective?
- iii) Think of a time when you saw a team member do something in a situation and you thought to yourself, "If I were in that same situation, I would have handled it differently." What was the scenario you saw?
- iv) Think back to group projects that you have been part of, can you remember a time when the team's progress may have been at a standstill or hindered. What happened to cause the problem? Or what happened to improve the situation?
- v) Think back to a group that you remember working well together. What were some of the enablers of the group's performance?

Tips for Writing Critical Incident Report - Overhead

- 1) Concisely describe the situation, the action taken, and the outcome. Carefully decide what information is relevant to each event.
- 2) Describe what the team member did (or failed to do) in that specific situation. Do not describe, “types of things people do” or general traits of effective or ineffective workers. The emphasis should be on what was observed, not on interpretation of the action.
- 3) Focus on the actions of a single person rather than those of a team.
- 4) Write events in the third person (he or she) and do not use personally identifying information. Use terms such as “the team member” and “the student”. Even if you relate events that are things you did please write them in the third person.
- 5) Write about actions you have taken or the actions of others that you have personally observed, not situations reported to you by someone else, because your recollection of these events will be the most vivid and accurate.

Ineffective Critical Incident Report Form

1. What was the situation leading up to the event? (describe the context)

2. What did the team member do?

3. What was the outcome or result of the team member's action?

Circle the number below that best reflects the level of performance that this event exemplifies.

1	2	3	4	5	6	7
Highly Ineffective			Moderately Effective			Highly Effective

Effective Critical Incident Report Form

1. What was the situation leading up to the event? (describe the context)

2. What did the team member do?

3. What was the outcome or result of the team member's action?

Circle the number below that best reflects the level of performance that this event exemplifies.

1	2	3	4	5	6	7
Highly Ineffective			Moderately Effective			Highly Effective

Poor Critical Incident Report

1. What was the situation leading up to the event? (describe the context)

During the installation of a new feeder on the exterior of a building, it was decided to carry the cable up a nearby exterior stairway and push the cable down into the conduit.

2. What did the worker do?

The cable easily went into the conduit. However, as it gained momentum all of the cable went through the conduit and out onto the ground.

3. What was the outcome or result of the worker's action?

The crew had to repeat the job, but this time the cable was tied off on the high end of the conduit.

Circle the number below that best reflects the level of performance that this event exemplifies.

1	2	3	4	5	6	7
Highly Ineffective			Moderately Effective			Highly Effective

Good Critical Incident Report

1. What was the situation leading up to the event? (describe the context)

The electrician was to install a new feeder on the exterior of a large 10-story building, and there was no obvious method for getting the cable through the conduit.

2. What did the worker do?

The electrician decided to run the cable up a nearby stairway and drop the cable in from above. He placed the bottom end of the cable into the conduit and let it go so that gravity would pull the cable through the conduit. He failed to tie off the top end of the cable to keep it from falling to the ground. The cable gained momentum as more and more cable went into the conduit, and the electrician was unable to stop it when it got to the end.

3. What was the outcome or result of the worker action?

All of the cable slipped through the conduit and landed on the ground. The electrician had to repeat the job, but this time the cable was tied off on the high end of the conduit.

Circle the number below that best reflects the level of performance that this event exemplifies.

1	2	3	4	5	6	7
Highly Ineffective			Moderately Effective			Highly Effective

Appendix B

Mean Effectiveness Ratings of Critical Incidents

Initiative

Critical incident number	Number of respondents placing an incident with a particular dimension (/9)	Percent of respondents placing an incident with a particular dimension	Mean effectiveness rating of incidents	Standard Deviation of effectiveness rating
7.00	7.00	77.80	5.89	.78
17.00	7.00	77.80	5.78	1.09
18.00	7.00	77.80	5.67	1.22
105.00	6.00	66.70	6.11	.78
161.00	8.00	88.90	6.44	.73
162.00	7.00	77.80	6.33	.87

Subject Matter Expert

Critical incident number	Number of respondents placing an incident with a particular dimension (/9)	Percent of respondents placing an incident with a particular dimension	Mean effectiveness rating of incidents	Standard Deviation of effectiveness rating
37.00	7.00	77.80	5.22	.97
51.00	6.00	66.70	5.40	1.51
73.00	6.00	66.70	6.11	.60
233.00	7.00	77.80	6.22	.83
243.00	6.00	66.70	6.22	.83

Tolerance

Critical incident number	Number of respondents placing an incident with a particular dimension (/9)	Percent of respondents placing an incident with a particular dimension	Mean effectiveness rating of incidents	Standard Deviation of effectiveness rating
250.00	6.00	66.70	1.67	1.00

Problem Solving

Critical incident number	Number of respondents placing an incident with a particular dimension (/9)	Percent of respondents placing an incident with a particular dimension	Mean effectiveness rating of incidents	Standard Deviation of effectiveness rating
27.00	9.00	100.00	5.78	1.09
30.00	8.00	88.90	5.50	1.41
33.00	7.00	77.80	6.00	.87
180.00	6.00	66.70	1.56	.73
215.00	6.00	66.70	1.89	.60

Organization

Critical incident number	Number of respondents placing an incident with a particular dimension (/9)	Percent of respondents placing an incident with a particular dimension	Mean effectiveness rating of incidents	Standard Deviation of effectiveness rating
19.00	8.00	88.90	5.33	.71
25.00	7.00	77.80	6.00	1.00
58.00	8.00	88.90	1.67	.71
84.00	6.00	66.70	6.30	1.00
109.00	8.00	88.90	5.20	.83
142.00	6.00	66.70	6.60	.50
165.00	6.00	66.70	6.11	.93
208.00	7.00	77.80	6.56	.73
230.00	6.00	66.70	6.56	.53

Communication

Critical incident number	Number of respondents placing an incident with a particular dimension (/9)	Percent of respondents placing an incident with a particular dimension	Mean effectiveness rating of incidents	Standard Deviation of effectiveness rating
75.00	6.00	66.70	6.33	.50
83.00	6.00	66.70	6.20	.67
123.00	7.00	77.80	2.33	.87
201.00	7.00	77.80	6.33	1.12
212.00	6.00	66.70	2.00	.71
217.00	6.00	66.70	1.38	.52
232.00	8.00	88.90	6.33	.71
235.00	7.00	77.80	5.67	1.50
260.00	7.00	77.80	1.56	.53

Cooperation/Collaboration

Critical incident number	Number of respondents placing an incident with a particular dimension (/9)	Percent of respondents placing an incident with a particular dimension	Mean effectiveness rating of incidents	Standard Deviation of effectiveness rating
21.00	6.00	66.70	2.87	1.13
24.00	7.00	77.80	6.33	.71
34.00	8.00	88.90	5.78	1.39
35.00	6.00	66.70	5.78	.83
41.00	7.00	77.80	6.00	1.00
59.00	6.00	66.70	1.30	.50
61.00	7.00	77.80	5.67	.87
66.00	6.00	66.70	2.11	1.17
79.00	7.00	77.80	6.22	.83
81.00	7.00	77.80	6.44	.53
104.00	6.00	66.70	6.33	.50
113.00	8.00	88.90	6.11	.78
121.00	7.00	77.80	1.75	.71
136.00	6.00	66.70	1.67	.87
148.00	7.00	77.80	1.44	.73
168.00	6.00	66.70	6.33	1.00
177.00	6.00	66.70	1.78	.83
182.00	9.00	100.00	6.67	.50
183.00	6.00	66.70	6.67	.50
184.00	8.00	88.90	6.56	.53
197.00	6.00	66.70	1.44	.53
226.00	6.00	66.70	3.56	2.00
244.00	8.00	88.90	6.67	.50
245.00	6.00	66.70	6.22	.83

Motivation of Others

Critical incident number	Number of respondents placing an incident with a particular dimension (/9)	Percent of respondents placing an incident with a particular dimension	Mean effectiveness rating of incidents	Standard Deviation of effectiveness rating
3.00	6.00	66.70	5.78	1.20
4.00	7.00	77.80	6.30	.71
65.00	7.00	77.80	1.56	.53
68.00	9.00	100.00	6.20	1.30
108.00	9.00	100.00	6.75	.46
114.00	9.00	100.00	6.30	.50

Dedication

Critical incident number	Number of respondents placing an incident with a particular dimension (/9)	Percent of respondents placing an incident with a particular dimension	Mean effectiveness rating of incidents	Standard Deviation of effectiveness rating
38.00	7.00	77.80	6.11	.78
53.00	7.00	77.80	1.56	.73
56.00	8.00	88.90	1.56	.53
93.00	7.00	77.80	1.30	.50
96.00	8.00	88.90	1.88	.64
98.00	8.00	88.90	1.44	.53
103.00	7.00	77.80	1.75	.71
120.00	6.00	66.70	1.44	.53
124.00	9.00	100.00	1.33	.50
125.00	6.00	66.70	2.11	1.54
127.00	7.00	77.80	1.89	1.36
133.00	6.00	66.70	1.89	.93
134.00	8.00	88.90	1.56	.73
135.00	6.00	66.70	1.33	.50
139.00	7.00	77.80	5.78	1.92
149.00	7.00	77.80	1.33	.50
156.00	6.00	66.70	1.78	.83
169.00	6.00	66.70	2.00	1.94
173.00	6.00	66.70	1.56	.73
174.00	6.00	66.70	1.63	.52
175.00	6.00	66.70	1.78	1.30
178.00	9.00	100.00	1.67	.71
187.00	9.00	100.00	1.56	.73
188.00	8.00	88.90	1.33	.50
190.00	6.00	66.70	1.89	.78
192.00	9.00	100.00	1.22	.44
193.00	6.00	66.70	1.44	.53
194.00	7.00	77.80	1.56	.73
195.00	6.00	66.70	3.00	1.66
196.00	6.00	66.70	1.78	.67
211.00	7.00	77.80	1.33	.50
220.00	6.00	66.70	2.56	1.81
221.00	6.00	66.70	1.67	.71
229.00	7.00	77.80	2.11	1.90
236.00	6.00	66.70	1.56	.73

Appendix C

Competency Peer Evaluation of Individual Team Performance

Respondent's code : _____

Team member's code: _____

Read each statement carefully. For each statement circle the number below the statement that best represents your opinion. Please indicate the frequency with which you have observed your team member perform the following behaviours.

- 1 – Almost never
 2 – Seldom
 3 – Sometimes
 4 – Often
 5 – Almost always

initiative:

1. The team member influences the flow of events instead of submitting to them.

Almost Never 1 2 3 4 5 Almost Always

2. The team member has to be prompted to take responsibility for a task.

Almost Never 1 2 3 4 5 Almost Always

3. When encountering a problem or obstacle the team member takes the initiative to solve it him or herself.

Almost Never 1 2 3 4 5 Almost Always

4. The team member undertakes new activities related to the group's objectives with enthusiasm.

Almost Never 1 2 3 4 5 Almost Always

5. The team member displays boldness in taking on new projects.

Almost Never 1 2 3 4 5 Almost Always

- 1 – Almost never
- 2 – Seldom
- 3 – Sometimes
- 4 – Often
- 5 – Almost always

Subject Matter Expert

6. When working on a group project or goal, the team member gathers the relevant information to help accomplish the project or goal.

Almost Never 1 2 3 4 5 Almost Always

7. The team member is incompetent in the subject related to group's project or activities.

Almost Never 1 2 3 4 5 Almost Always

8. The team member has the necessary skills and abilities to accomplish the group task.

Almost Never 1 2 3 4 5 Almost Always

9. The team member possessed extensive knowledge concerning a specific subject or activity that helped accomplish a group task or goal.

Almost Never 1 2 3 4 5 Almost Always

10. The team member has the experience needed to help the team accomplish its goals.

Almost Never 1 2 3 4 5 Almost Always

Problem Solving:

11. The team member's inefficient solutions hinder rather than help the group.

Almost Never 1 2 3 4 5 Almost Always

- 1 – Almost never
- 2 – Seldom
- 3 – Sometimes
- 4 – Often
- 5 – Almost always

12. The team member solves problems without thoroughly thinking out the solution.

Almost Never 1 2 3 4 5 Almost Always

13. The team member's suggestions are based on thorough consideration of the relevant information.

Almost Never 1 2 3 4 5 Almost Always

14. The team member is able to solve problems with minimal input from others.

Almost Never 1 2 3 4 5 Almost Always

15. The team member suggests efficient solutions to problems.

Almost Never 1 2 3 4 5 Almost Always

Organization:

16. The team member displays the ability to break up complex tasks into smaller groups/tasks.

Almost Never 1 2 3 4 5 Almost Always

17. The team member is able to organize activities or projects so that the work is fairly distributed among the remaining team members.

Almost Never 1 2 3 4 5 Almost Always

18. The team member displays the ability to foresee the flow of activities and necessary resources needed to accomplish planned projects.

Almost Never 1 2 3 4 5 Almost Always

- 1 – Almost never
- 2 – Seldom
- 3 – Sometimes
- 4 – Often
- 5 – Almost always

19. The team member incorporates' his or her team member's suggestions and input when organizing activities and delegating jobs.

Almost Never 1 2 3 4 5 Almost Always

20. The team member is bad at organizing activities or group tasks.

Almost Never 1 2 3 4 5 Almost Always

Communication:

21. The team member fails to notify the rest of the team of important information or details.

Almost Never 1 2 3 4 5 Almost Always

22. The team member provides clear instruction.

Almost Never 1 2 3 4 5 Almost Always

23. The team member explains things clearly and effectively to his or her team members.

Almost Never 1 2 3 4 5 Almost Always

24. The team member actively listens to his/her teammates and considers their opinions and ideas.

Almost Never 1 2 3 4 5 Almost Always

25. The team member provides constructive criticism and feedback to his or her team members.

Almost Never 1 2 3 4 5 Almost Always

- 1 – Almost never
- 2 – Seldom
- 3 – Sometimes
- 4 – Often
- 5 – Almost always

Motivation of Others:

26. The team member criticizes other team members.

Almost Never 1 2 3 4 5 Almost Always

27. The team member inspires others to persevere in the face of problems, obstacles, or despair.

Almost Never 1 2 3 4 5 Almost Always

28. The team member encourages others in the team.

Almost Never 1 2 3 4 5 Almost Always

29. The team member possesses a positive attitude that leads team members toward action.

Almost Never 1 2 3 4 5 Almost Always

30. The team member motivates others in the team.

Almost Never 1 2 3 4 5 Almost Always

Cooperation/Collaboration:

31. The team member works independently even when the job is a cooperative group activity.

Almost Never 1 2 3 4 5 Almost Always

32. The team member recognizes situations that require group participation or collaborative efforts.

Almost Never 1 2 3 4 5 Almost Always

- 1 – Almost never
- 2 – Seldom
- 3 – Sometimes
- 4 – Often
- 5 – Almost always

33. The team member attempts to take over group situations.

Almost Never 1 2 3 4 5 Almost Always

34. The team member helps his or her teammates to accomplish team goals or tasks.

Almost Never 1 2 3 4 5 Almost Always

35. The team member works collaboratively with his or her teammates for a common purpose.

Almost Never 1 2 3 4 5 Almost Always

Dedication:

36. The team member displays commitment to the group.

Almost Never 1 2 3 4 5 Almost Always

37. The team member displays a sense of responsibility to the team or the team goal.

Almost Never 1 2 3 4 5 Almost Always

38. The team member displays a lack of dedication to the team.

Almost Never 1 2 3 4 5 Almost Always

39. The team member complains about doing group work.

Almost Never 1 2 3 4 5 Almost Always

40. The team member fails to complete his/her share of the group work.

Almost Never 1 2 3 4 5 Almost Always

Appendix D

**Take a Study Break and Make \$10
Research Participants Needed**

Hello! My name is Cinthia Branco, and I am a graduate student in the psychology department at Saint Mary's University. I am trying to complete my Masters thesis and I am looking for research participants. The focus of my thesis is on teamwork. Your participation is very important to me because acquiring a team sample is difficult.

Requirements

- 1 hour of your time
- paid \$10 on the spot or 2 psychology bonus points
- part of a team→ minimum of 3 teammates must participate, but not necessarily at the same time
- all responses are completely confidential

This study involves the completion of 4 sets of questionnaires. The time required for the completion of the questionnaires is approximately 1 hour. There are no risks involved in this study. Those who participate will *receive \$10 for 1 hour of their time or 2 psychology bonus points.*

In order to participate in this study you must be part of a team, and a minimum of 3 people from your team must agree to participate. One set of questionnaires will include peer ratings, thus it is important that I know who your teammates are in order to poll the team responses together. However, you are not required to complete the questionnaires at the same time. All responses, including your peer responses, will remain completely confidential. Once I have established who your teammates are,

they will be given a code and neither your teammates names or your name will be attached to the responses. *I will set up testing times from April 7th to April 15th.*

If you are interested in participating, please contact me at 420-5107 or at C_Branco@stmarys.ca.

Appendix E

Peer Evaluation of Individual Team Performance

1. Please write the numerical code of the teammate that you will be evaluating

2. Circle the number below that best reflects the level of performance that your teammate has displayed during your group projects.

i) How effective was your colleague as a team member?

1	2	3	4	5	6	7
Highly Ineffective			Moderately Effective			Highly Effective

ii) How productive was your teammate?

1	2	3	4	5	6	7
Highly Unproductive			Moderately Productive			Highly Productive

iii) How efficient was your teammate in the work group?

1	2	3	4	5	6	7
Highly Inefficient			Moderately Efficient			Highly Efficient

iv) How helpful was your teammate to the group project?

1	2	3	4	5	6	7
Highly Unhelpful			Moderately Unhelpful			Highly Helpful

v) If you could grade your teammate on his or her team performance, what grade would you give him or her?

F	D	C	C+	B	B+	A
---	---	---	----	---	----	---

vi)

Please rate your teammate's overall performance.				
Excellent	Good	Average	Fair	Poor
My teammate made a significant contribution to this project; s/he provided a great deal of effective support and input; s/he challenged us to work to create a great project.	S/he provided a lot of input and support that was relatively effective.	S/he provided some input and support.	S/he provided minimal input to the project.	S/he did not contribute to the project at all.
7	6 5	4	3 2	1

vii)

Please rate the participation of your teammate				
Excellent	Good	Average	Fair	Poor
The person was essential to the completion of the project	The person did more than his or her share.	The person participated to the same extent as anyone else.	The person had to be "prodded" to contribute; did less than others.	The person did not contribute to the project at all..
7	6 5	4	3 2	1

3. Please rank your teammate on his or her team performance, versus his or her other team members. For example, if there are 5 members on your team (including yourself) rate the team member who displays the best team performance as "1" and rate the person who is the least effective team member as "5". Do not forget to consider yourself when ranking your teammate.

Please indicate how many members there are in your team _____

Please rank you teammate _____

Appendix F

Means and Standard Deviations of the Questions on the Competency BOS

Question number	Mean	Standard Deviation
1	3.39	.91
2	3.69	.96
3	3.70	1.02
4	3.72	.92
5	3.58	.98
6	3.92	.95
7	4.15	.79
8	4.26	.65
9	3.75	.85
10	3.97	.76
11	4.28	.79
12	3.94	.72
13	3.85	.80
14	3.59	.85
15	3.81	.89
16	3.57	.93
17	3.44	.97
18	3.60	.90
19	3.92	.80
20	4.13	.95
21	4.23	.82
22	3.74	.91
23	3.90	.76
24	4.22	.69
25	3.53	.80
26	4.39	.68
27	3.30	.90
28	3.63	.88
29	3.75	.95
30	3.63	.94
31	3.51	.87
32	3.99	.76
33	3.79	1.02
34	3.94	.81
35	4.14	.82
36	4.28	.99
37	4.17	.97
38	4.35	1.00
39	4.45	.69
40	4.48	.95



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Saint Mary's University

Certificate of Ethical Acceptability of Research Involving Human Subjects

This is to certify that the Research Ethics Board has examined the research proposal or other type of study submitted by:

Principal Investigator: Cinthia Branco

Name of Research Project: Competency Profiling for Effective Performance of Individual Team Members

REB File Number: 2003-018

and concludes that in all respects the proposed project meets appropriate standards of ethical acceptability and is in accordance with the Tri-Council Policy Statement on the Conduct of Research Involving Humans. Please note that approval is only effective for one year from the date approved. (If your research project takes longer than one year to complete, submit form #3 to the REB at the end of the year and request an extension.)

Date:

Feb. 21, 2003

Signature of REB Chair:

Dr. John E. MacKinnon