

THE EFFECTS OF TEAM DYNAMICS TRAINING ON CONCEPTUAL
DATA MODELING TASK PERFORMANCE

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Database modeling is a complex conceptual topic often taught through the use of project-based teams. One of the problems with the use of project-based teams in university courses is the determination of whether this is the most effective use of instructor and student time involvement and effort level. Therefore, this study investigated the impact of providing team dynamics training prior to the commencement of short-duration project-based team conceptual data modeling projects on individual data modeling task performance (DMTP) outcomes and team cohesiveness.

The literature review encompassed conceptual data design modeling, the use of a project-based team approach, team dynamics and cohesion, self-efficacy, gender, and diversity. The research population consisted of 75 university students at a North American University (Canadian) pursuing a business program requiring an information systems course in which database design components are taught.

Analysis of the collected data revealed that there was a statistically significant inverse relationship found between the provision of team dynamics training and individual DMTP. However, no statistically significant relationship was found between team dynamics training and team cohesion. Therefore, this study calls into question the value of team dynamics training on learning outcomes in the case of very short duration project-based teams involved in conceptual data modeling tasks. Additional research in this area would need to clarify what about this particular experiment might have contributed to these results.

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CHAPTER 1

INTRODUCTION

Teams are used in university settings for a variety of reasons. The use of teams as a learning tool serves to mimic the workplace environments to which graduates will soon be exposed (Chen, Donahue, & Klemoski, 2004; O'Reilly & Michels, 1994; Woodfield, Collofello, & Collofello, 1983). For example, as Woodfield et al. (1983) related, a large amount of the work accomplished in the information systems (IS) field, including database design, is accomplished through team efforts, and thus IS faculties consider it prudent to use teams or cooperative efforts to accomplish larger class projects more closely mirroring the real-world workplace environment. Pedagogical reasons include the belief that team projects enrich the scope of the project possibilities while also fostering greater learning opportunities through peer relationships (Brown & Dobbie, 1999). Therefore, this study was designed to evaluate the enhancement effect or the return on student and professor resources investment through the provision of team dynamics training.

Background of the Study

A review of the research literature reveals that team projects are used to teach various disciplines and that IS faculty, like those in numerous other disciplines, often use project-based teams to teach a variety of subjects and topics, including database design (Chen et al., 2004; Hayes, Lethbridge, & Port, 2003). Information systems are increasingly database driven or enabled, or, more accurately stated, modern information systems are database dependent. This has made it "necessary for today's IS professionals to be proficient in database design skills" (Ryan, Bordoloi, & Harrison, 2000, p. 9). The requirement for IS professionals to be proficient

in database design skills has been extended to include non-IS professionals due to the increasing availability of database software. Faculty who teach management information systems or business information systems courses often include a database design component in courses that are frequently a requirement in the curriculum for a business student (Hardin-Simmons University [HSU], n.d.; Trinity Western University [TWU], 2005).

Learning database design or data modeling requires mastery of a considerable body of new terminology as well as a different way of conceptualizing data and relationships between various data. Students must progress from *declarative knowledge*, or knowing about, to *procedural knowledge*, knowing how. Such a progression is facilitated by lecture, reading, and doing – active learning (Chen et al., 2004). Because of this, there is a continuing need for additional research into the pedagogical methods of training a broad spectrum of novice database design students. According to Kane (2004), *active learning*, or *participatory learning* (the terms are often used interchangeably),

both (a) seek to encourage independent, critical thinking in learners (b) encourage learners to take responsibility for what they learn (c) engage learners in a variety of open-ended activities (projects, discussions, role-play exercises and so on) to ensure they have a more protagonistic, less passive role than in “the transfer of knowledge” view of education. (p. 277)

One method of implementing active learning into a study of conceptual data modeling is through the utilization of project-based teams (Kane, 2004). Project-based team learning is one area in which additional research is needed, as noted by Ryan et al. (2000) and Chen et al. (2004).

Need for the Study

Research has identified a need for more emphasis on team dynamics training within the university-level curriculum. According to Chen et al., (2004) more needs to be done to develop teamwork knowledge, skills, and attitudes in university curricula. They believed that it is important to employ "active instructional strategies when developing teamwork . . . such as having students participate in various team exercises" to better prepare students for the transition from the university to the workplace (Chen et al., 2004, p. 37). In the United Kingdom the Enterprise in Higher Education (EHE) initiative was developed to provide "transferable personal skills [to students] as well as the academic content of what they are studying . . . [that is] groupwork, presentation and self- and peer-assessment skills" (Humphreys, Greenan, & McIlveen, 1997). Lovgren and Racer (2000) even suggested that "teaching engineering students about the social skills required to have effective teamwork and group dynamics is as important as teaching basic engineering skills" (p. 156). This is coupled with their belief that "not enough has been done in educational settings, particularly in higher education . . . to explicitly develop teamwork," and that "traditional emphasis on individualistic achievement in university-level curricula still prevails" (Chen et al., 2004, p. 28).

Some studies (Ryan et al., 2000) have indicated that team based projects do not significantly affect the learning outcome. Specifically, the study by Ryan et al. challenged the traditional assumption that the project-based team approach is of value in short duration learning situations and, in particular, conceptual data modeling task performance (DMTP). They suggested that additional research into the impact of training with regard to intragroup considerations that can affect team cohesiveness needs to be investigated. Lovgren and Racer's research (2000) supported this recommendation. They found that, while teams in the workplace have time to develop, teams in the classroom often do not have the luxury of adequate time to

develop, and therefore students need faculty emphasis on team dynamics. Lovgren and Racer found that it is ineffective for students to learn group dynamics through a passive process of learning while doing. They contended that, perhaps with the right team dynamics information, training, and impetus, student project-based teams could achieve greater levels of competency. Thus, the intent of this study is to fill a need for further investigation into the impact of providing team dynamics training to teams prior to the commencement of short-duration conceptual data modeling projects.

Theoretical Framework

Teams are a constant in today's work environment. They come in many shapes and sizes, exist for a short time or a long time, are real or virtual, and are created for a variety of purposes. In most cases, the primary purpose of team creation is to contribute to the survival of the organization from which the teams were formed. "Creating and supporting stable team environments are crucial to the survival of a young firm. A similar challenge may face temporary teams," for example, task forces or project-based teams (Hartenian, 2003, p. 28). In the case of information technology and the social-technical issues involved in the conceptualization, design, creation, implementation, utilization, and management of information systems, teams are essential, because no single individual possesses the resources (knowledge, skill, talents, physical, fiscal, time, etc.) to accomplish all tasks himself or herself. "A systems development *project* [italics added] is an excellent technique for helping . . . consolidate individual concepts in order to produce a finished . . . project" (Carver, 1985, p. 9). This is especially true with regard to modern database system projects.

Thus, information system database project-based teams are a reality that is here to stay, at least for the foreseeable future. This reality, combined with pressing educational needs, has made the use of project-based teams a common part of conceptual data modeling tasks in university settings. Understanding how to make the learning experience more effective and efficient is of importance to researchers, academics, and practitioners. As Burden and Proctor (2000) delineated, "Training is, in fact, a tool used to change people's behavior, and therefore the evaluation of its effectiveness is centered on measuring change" (p. 96). Several theoretical frameworks are important to the research effort to answer the questions about the effectiveness of providing team dynamics training. This section discusses three theoretical frameworks –self-efficacy, cohesion, and diversity – all of which are believed to impact task performance and possibly learning outcomes.

Self-Efficacy, Cohesion, and Diversity

A strong sense of self-efficacy can enhance performance by helping individuals to view a difficult task as a challenge to be mastered, fostering a sense of intrinsic interest and involvement in the task or activity, instilling a desire to acquire knowledge to accomplish the task, and enabling them to recover quickly from apparent failure producing “bounce-back” capability (Bandura, 1994). Self-efficacy works through cognitive, motivational, affective, and selection processes to provide a sense of being in control of the situation and, perhaps most importantly, to produce personal accomplishment and reduce stress. Bandura explained that self-efficacy can be acquired in four ways. It can be acquired through mastery experience (mastering a task or skill); vicarious experiences (seeing one's peers succeed, and the stronger the similarity in peers, the stronger the impact on self-efficacy); social persuasion (being verbally persuaded that one

possesses the capabilities to succeed); and the physical and emotional states experienced while engaged in the activity or task (the better one feels physically and emotionally the more one believes – reinforces self-efficacy – he or she is succeeding or can succeed at the task).

Small groups can be an incubator to varying degrees for each of these four methods of acquiring self-efficacy. A high degree of "groupness" of the group, at least as proposed by some researchers, conveys the special status of being a team, and a "team is a collection of individuals who are interdependent in their tasks, who *share responsibility for outcomes* [italics added], who see themselves and who are seen by others as an *intact social entity* [italics added] embedded in one or more larger social systems" (Cohen & Bailey, 1997, p. 241).

Thus, a well-functioning team can provide a vicarious mastery experience aided by social persuasion in an enhanced physical and emotional environment through the sharing of the task. As Bandura (1994) stated, "The strength of groups, organizations, and even nations lies partly in people's sense of collective efficacy that they can solve the problems they face and improve their lives through unified effort" (¶46). Thus, successfully conducted team dynamics training should theoretically impact collective and individual self-efficacy, because self-efficacy has been shown to be a reasonable surrogate for collective efficacy.

Team cohesion, or the dynamic process reflected in the tendency of a group to remain united in the pursuit of its goals and objectives, has often been used as a surrogate for team dynamics, and as Carron et al. (2003) reported, "cohesion and performance have been conceptually intertwined since 1935 when Kurt Lewin coined the term group dynamics" (p. 467). Cohesion has been operationalized and measured cognitively as perceptions about closeness and bonding and as the individual's attractions to remain in the group (Carron et al., 2003). Cohesion has been conceptualized as having two major domains: group and individual. These two

domains have been subdivided into social and task orientations. Thus team cohesion is viewed as a multifaceted construct with four domains: group-social, group-task, individual-social, and individual-task (Brawley, Carron, & Widmeyer, 1987). Additionally, over the years cohesion has been utilized as a surrogate variable indicative of the success of team dynamics training and the impact on team performance by numerous researchers (Carron et. al., 2003; Carron et. al., 2004; Elliot, 1998; Siebold, 1999). Thus, cohesion, or cohesiveness in this study, is viewed as influenced by team dynamics training, thereby serving as a variable indicative of the effectiveness of team dynamics training.

Diversity can include a gamut of possible items on which a given group of people can differ or be diversified. Chuang, Church, and Zikic (2004), based on past research, listed “five major individual demographic attributes which influence organizational functioning;” age, gender, race/ethnicity, organizational tenure, and functional background (p. 26). The focus of diversity in this study is on two such elements, gender and race/ethnicity, defined as native language. Each element is treated and analyzed independently as variables able to influence self-efficacy and team cohesion and impact individual conceptual data modeling task performance (DMTP). Based on the work of Baron and Kenny (1986) and Zeegers (2004), this study adopted the view that the two elements gender and native language are neither moderators nor mediators, but independent variables with regard to self-efficacy, team cohesion, and individual DMTP.

In their paper Baron and Kenny (1986) carefully pointed out the distinctions between moderator and mediator variables. The main characteristics of a moderator variable are that it “affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable” and a moderator variable “always function[s] as independent variables” (p. 1174). On the other hand, Baron and Kenny stated that “a given

variable may be said to function as a mediator to the extent that it accounts for the relation between the predictor and the criterion” (p. 1176). Zeegers (2004) labeled *antecedent* variables as variables “that are not influenced by other variables in the model ” (p. 43) but which may influence other variables in the model or system under consideration. In this study gender and native language, in keeping with the research reviewed, are considered to be independent or antecedent variables which can directly affect or influence self-efficacy, team cohesion, and individual DMTP. At the same time they do not affect (moderate) the relationships between self-efficacy and team cohesion and individual DMTP nor do they account for (mediate) the relationships.

Researchers in various domains of small-group dynamics have found mixed results with respect to the impact of gender on roles, responsibilities, tasks, performance, and other interpersonal group interactions (Karakowsky, McBey, & Miller, 2004; Karakowsky & Miller, 2002). For example, researchers studying the emergence of leadership within small groups have found mixed results related to gender. Gershenoff and Foti (2003) reported that gender-typed leadership (masculine-intelligent, androgynous-intelligent, and feminine-intelligent) emergence is impacted by the “leadership being studied (i.e., task-oriented or interpersonally oriented), gender orientation of the task (i.e., masculine or feminine), and the social complexity of the task” (p. 171). Additionally, many studies have found a relationship between gender dynamics or distribution of work teams and power and influence manifested in behavior, for example, verbal interruptions (Karakowsky et al., 2004).

Native language is used in this study as an indication or a *signal* (using signal as a symbol, object, sound, or image that conveys information – as taken from *Merriman-Webster's Online Dictionary*) of the race/ethnic or cultural background of an individual. Native language is

perhaps a better sign of the cultural grouping of individuals than even racioethnic distinctions, which are often generalized as White, Black, Asian, and Hispanic. Lawrence in his criticism of “the scant attention given to intervening processes in the demograph[ic] literature as the ‘black box’ of demograph[ic] research” illustrated this tendency toward overgeneralization (as cited in Sargent & Sue-Chan, 2001, p. 427). It is an increasingly common experience, as Sargent and Sue-Chen pointed out, that there exists a sizeable body of racioethnic divisions in the workplace; however, to say that two individuals are racioethnically Asian is not nearly as specific as saying that the two individuals' native languages are Chinese Cantonese and Filipino. It may even be the case that both individuals are racially Chinese; however, one was reared in China and the other grew up as part of a third-generation expatriate Chinese family living in the Philippines who spoke Filipino in all daily activities outside the home, but Chinese Cantonese in the home with their first-generation grandparents. While the former claims Chinese Cantonese as his native language, the latter claims Filipino; thus, they identify themselves with the larger culture in which they have grown up. Because the School of Business student population at the university where this study was conducted is diverse with regard to native language among the Asian subpopulation, native language is considered a more specific indicator of the diversity within teams.

Purpose

The purpose of this study was to investigate the impact of providing team dynamics training to teams prior to the commencement of short-duration conceptual data modeling projects to determine whether such training enhances individual data modeling task performance (DMTP).

Statement of the Problem

The complexities of the modern workplace require the use of teams to accomplish essential business processes, functions, and objectives. Educators routinely use project-based teams to teach difficult conceptual topics. Database modeling is a complex conceptual topic often taught through the use of project-based teams. One of the problems with the use of project-based teams in university courses is the determination of whether this is the most effective use of instructor and student time involvement and effort level. Therefore, this study investigated the impact of providing team dynamics training prior to the commencement of short-duration project-based team conceptual data modeling projects on individual DMTP outcomes and team cohesiveness.

Statement of Hypotheses

As depicted in Figure 1 the hypotheses tested were that learning mode (LM – team dynamics training or no team dynamics training), self-efficacy (SE), gender (GEN), team diversity (TD), and team cohesiveness (TC) (H_01) did not affect individual DMTP and that LM did not affect team cohesiveness (H_02).

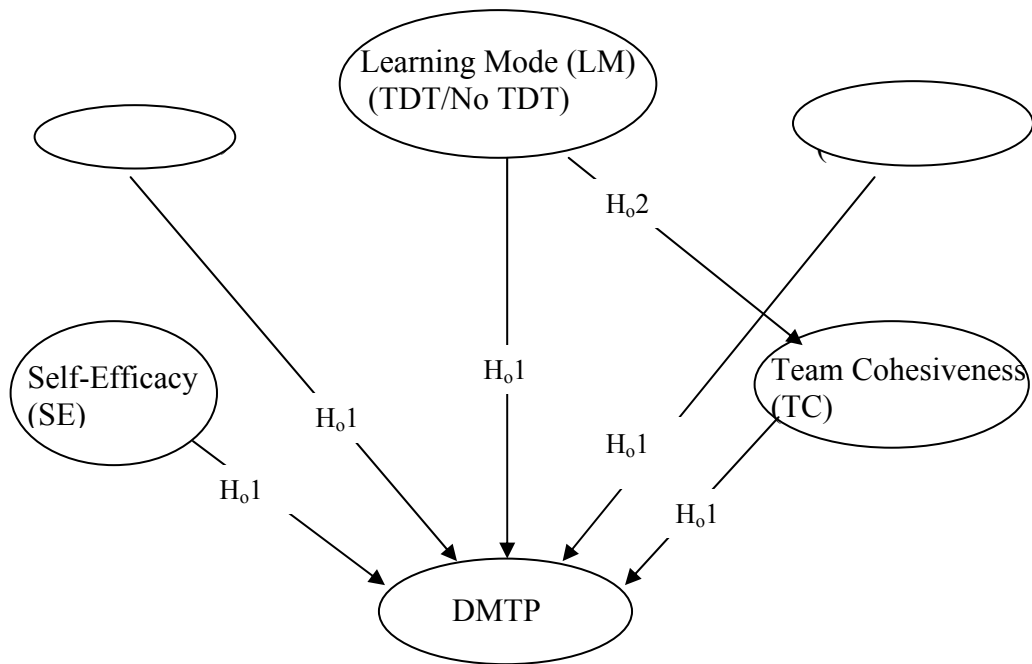


Figure 1. Research model: TDT mean team dynamic training.

Therefore, the following null hypotheses were investigated:

H₀₁: There is no statistically significant relationship between LM, SE, TC, GEN, and TD, when taken collectively, and individual DMTP.

H₀₂: There is no statistically significant relationship between LM and TC.

Limitations

Because this study was limited to 3rd- and 4th-year business students in the School of Business at a private university in Canada, the ability to generalize may be limited. Although previous studies have identified pretraining motivation and cognitive ability as possible contributing factors to learning outcomes in cooperative learning, this study is limited to team

dynamics training, team cohesiveness, self-efficacy, gender, and diversity. However, the impact of pretraining motivation and cognitive ability was controlled by random assignment to the treatment group. Additionally, pretraining motivation was controlled by the fact that the posttest of individual DMTP was a part of each student's final course grade.

Delimitations

This study was designed to provide information on students enrolled in a business program of study at Trinity Western University in British Columbia, Canada.

Definition of Terms

The following terms are provided to clarify their meanings as used throughout this study:
Cohesion: The dynamic process that is reflected in the tendency for a group to remain united in the pursuit of its goals and objectives. Cohesion and team cohesion are used interchangeably in this study (Carron et al., 2004).

Diversity: The differences in native languages for individual subjects on the teams.

Project-based team: A team involved in time- and output-limited and, for the most part, nonrepetitive projects or tasks, for example, a team involved in a short-duration class project with limited deliverables or assignments.

Team: "A team is a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems," for example, a group within a class with a specific purpose or task to accomplish (Cohen & Bailey 1997, p. 241). It should be noted

that the words *team* and *group* are used interchangeably throughout this study. However, *team* is more commonly used than *group*. As reported by Cohen and Bailey and demonstrated by the title of the academic journal *Small Group Research*, academia often uses the word *group* – for example, *group dynamics*, *group efficacy*, *group cohesion*, *group effectiveness*. Some researchers contend that groups vary in their "groupness" and that groups that have developed a high degree of "groupness" should be labeled as teams (Cohen & Bailey, 1997).

Team dynamics: The behaviors, patterns, processes, roles, and responsibilities involved in maintaining balance as a team moves through various developmental stages (Wheelan & Williams, 2003).

Team dynamics training: Training to be provided to the treatment groups that includes information and limited practical exercises to facilitate efficacy and cohesion with regard to intragroup considerations such as team norms, roles, responsibilities, developmental stages, and constructive and destructive behavior.

Self-Efficacy: The belief in one's abilities to perform a specific task.

Summary

Chapter 1 discussed the fact that faculty, and Information Systems faculty in particular, use project-based team learning for a variety of practical and pedagogical reasons. Sometimes a team-based project may encompass the entire semester, and at other times it may be for a short duration. Research has called into question the effectiveness of the project-based team modality for short-duration projects. Therefore, this study focused on the impact of providing team dynamics training to students prior to commencement of short-duration project-based team or collaborative learning conceptual database modeling tasks. It investigated the collective

influence of team dynamics training, team cohesiveness, self-efficacy, and gender and diversity on individual data modeling tasks performance. It also attempted to demonstrate that there is a difference in the team cohesiveness of the teams provided team dynamics training and those teams not provided the training.

Chapter 2 is a review of the literature related to conceptual data modeling, project-based teams, team dynamics and cohesiveness, self-efficacy, gender, and diversity. Chapter 3 presents the population, sample, instrumentation and data collection procedures, and data analysis. Chapter 4 reports the result of statistical analysis of the data collected during the experiment and chapter 5 presents the findings, recommendations, and summary.

CHAPTER 2

LITERATURE REVIEW

The literature review was of necessity broad based in order to adequately address the problem of providing team dynamics training for the treatment group prior to the commencement of short-duration project-based team conceptual data modeling projects to test the stated hypotheses of no statistical difference in the individual DMTP outcomes, self-efficacy, and team cohesiveness of the control and treatment groups. Thus, the literature review encompassed conceptual data design modeling, the use of a project-based team approach in the form of project-based teams, team dynamics and cohesion, self-efficacy, gender, and diversity. The influence of the project-based team approach on learning outcomes was examined, as was the impact of gender, diversity, self-efficacy, and team cohesiveness on learning outcomes.

The review was divided into the following sections: conceptual data design modeling, project-based team approach, team dynamics and cohesion, self-efficacy, and gender and diversity.

Conceptual Data Modeling

Pigford (1992) made a case for the complexity of conceptual data design modeling and the use of teams in the process when he stated that, "as the complexity of the database environment grows and as the amount of data increases, the need for better team performance, efficacy, and management is apparent" (p. 28). Ryan et al. (2000) noted "one of the most preliminary, yet most *complex*, tasks in the database development process, requiring a substantial amount of learning and effort, is conceptual database design or data modeling" (p. 9). A number of pedagogical tools have been studied and used to facilitate the learning of data modeling,

including analysis of the similarities and difference between novice and expert database designers, feedback focused on improvement of conceptual data modeling, and the use of heuristics in the modeling process; however, "despite the advances that have been made, there continues to be a call for additional research on the pedagogy of training [database] novices" (Ryan et al., 2000, p. 9). The task of teaching conceptual data modeling is constantly changing as the seamless integration of databases within the World Wide Web and e-commerce continues to shape the fundamental nature of what is taught and how it is taught. Robbert and Ricardo (2000) reported that, although little consensus exists on content for database courses, "almost all courses assign some kind of Database Project . . . for teams to do" (p. 42). Project-based teams is one of the areas requiring further analysis as a suitable pedagogical tool for teaching conceptual data modeling because the use of projects involves high overhead costs in terms of student and professor time and effort investment (Pigford, 1992).

Project-Based Team Approach

Teams are prevalent in the workplace. Cohen and Bailey (1997) reported that the use of teams has increased greatly in order to meet competitive challenges. They observed that "82% of companies with 100 or more employees reported that they use teams" (p. 239). Cohen and Bailey also noted that one of the most needed skills required by new workplace demands is the ability to work in a team. Chen et al. (2004) emphasized the need for transportable – "competencies, which are generic to, or generalizable across teams and tasks" – teamwork knowledge, skills, and aptitude training in the university curriculum to prepare students for the transition to the workplace (p. 28).

Among the many benefits of information systems project-based teams are that (a) they are seen as motivating to students and that (b) "non-toy applications can be assigned by the lecturer" (Brown & Dobbie, 1999, p. 281). Additionally, project-based teamwork is viewed as an effective pedagogical tool in and of itself, especially when used in disciplines or situations that require mastery through active learning. Anewalt, Beidler, Polack-Wahl, and Smarkusky (2003) reported that group or team projects are used across the IS curriculum, including, but not limited to, electronic commerce programming, software development, and information technology courses. This is also the case with regard to the data modeling task, as Pigford (1987) indicated, "conveying to students in one semester the concepts of database systems is a feat in itself" and enabling them to actually conceptually model data only adds to the time demands of the students and the professor (p. 9). Project-based teams have the potential to provide all of the above benefits and possibly to reduce professor and student conceptual data modeling learning time commitments.

Team Dynamics and Cohesiveness

Elliott (1998), quoting Watson, wrote that "the effective use of teams may be 'America's best hope' for keeping pace with the international market" (1998, p. 1). According to Elliot, the need for teams to work effectively has fuelled an increase in research on team dynamics, resulting in numerous studies to improve team interactions and performance. Elliott conducted one such study, focusing on team dynamics training as the intervention or treatment variable and team performance in terms of task performance as the outcome variable. Elliott identified team dynamics as consisting of "cohesion, communication, goals, roles, leadership, procedures, and relationships" (p. 6). Elliot's study found a statistically significant relationship between team

dynamics training inclusive of these factors and team task completion in the amount of or degree of task completion. The study failed to find a statistically significant relationship between team dynamics training and group cohesiveness. Elliot postulated that this might have been due to rater bias and the fact that cohesiveness has been reported by "Nieva et al. . . . [as] not directly responsible for performance" and "that other variables such as group norms and standards set for the team interact with cohesiveness" (p. 7). However, as reported by Widmeyer, Brawley, and Carron (1985), although research findings with regard to team cohesion's influence on performance have been equivocal, the majority of findings strongly suggest that cohesion has a positive influence on performance.

Ryan et al. (2000) reported providing some team dynamics training through an instructor discussion of the roles frequently encountered in group or project-based teams, including that of coordinator, recorder, and resource person. Brown and Dobbie (1999) stated that they fostered limited team dynamics in project-based team situations by defining and establishing team structure for the teams when the projects were first assigned. The *Small Group Research* journal is replete with information regarding the importance of roles, goals, behavior, self-efficacy, and group-efficacy.

At this point, it is important to note two things. First, the studies of team dynamics training reviewed focused on learning team dynamics and task performance and not on the influence of team dynamics training on individual task performance or learning outcomes related to a specific task, in this case individual DMTP. Second, this study was focused on providing team dynamics training tailored to short-duration project-based teams.

Cohesion or cohesiveness (the degree of cohesion) within teams has often been used as a surrogate for measuring team dynamics; as stated by Carron et al. (2003), "Cohesion and

performance have been conceptually intertwined since 1935 when Kurt Lewin coined the term "group dynamics" (p. 467). Of the two fundamental processes associated with group performance, *cohesion* (activities associated with development and maintenance of the group) and *locomotion* (activities associated with obtain of goals or objectives), cohesion is antecedent to locomotion because "without group development and maintenance [cohesion], group locomotion cannot occur" (Carron et al., 2003, p. 468). Cohesion is operationalized and measured cognitively as perceptions about closeness and bonding ("we" or "us-ness") and as the individual's attractions to remain in the group ("I" or "me") (Carron et al., 2003). As have numerous researchers over the years (Carron et al., 2003; Carron et al., 2004; Siebold, 1999), Elliott (1998) essentially used cohesion as a surrogate or moderating variable indicative of the success of team dynamics training and the impact or influence on team performance. Cohesion or cohesiveness in this study was viewed as influenced by team dynamics training, thereby serving as a possible variable suggestive of the "success" of team dynamics training and also as able to influence individual DMTP.

Self-Efficacy

Self-efficacy, the belief that one has the ability to perform a specific task, is a concept related to cognition, which is one component of social cognitive theory. Social cognitive theory postulates that performance is affected by the interaction of cognition, the environment, and behavior (Baker, 2001). Numerous studies have shown that the amount of effort one devotes to a task and the goals individuals set are impacted by self-efficacy (Baker, 2001). Goddard (2001) reported that collective efficacy, a synonym for group efficacy, "is associated with the task, level of effort, persistence, thoughts, stress levels and achievements of groups" (p. 467) and that

collective-efficacy is analogous to self-efficacy. Despite numerous studies, much confusion still exists when researchers try to differentiate between self-efficacy and group or collective efficacy. However, following the work of Baker, who utilized Bar-Tal's (1990) distinction between personal, common, and group beliefs, in this study collective efficacy is defined as an individually held belief about both group and individual performance in the early stages of group or team development (Baker, 2001, p. 455). Baker stated that, "once a group belief has developed, the practical difference between what an *individual* believes about group performance and the individual's estimate about what the *group* believes about group performance become negligible" (p. 457). Thus, self-efficacy, is essentially a surrogate for collective efficacy, especially in the earlier stages of group development, and in particular in the case of short duration project-based teams. Baker hypothesized and demonstrated that such a relationship did in fact exist between self-efficacy and collective efficacy and that self-efficacy's potency as a surrogate for collective efficacy diminished over time, indicative of a danger of social loafing. Baker recommended that "individuals must be held accountable for their individual contributions" (Baker, 2001, p. 470). Additionally, Baker reported that collective efficacy and self-efficacy were reasonably good predictors of group and individual performance, respectively. Thus, this study focused on self-efficacy's influence on individual DMTP.

Gender and Diversity

Sargent and Sue-Chan (2001) reported a trend toward greater racioethnic diversity in most Western industrialized nations, which "presents a management challenge to organizations that are striving to understand how diversity influences the motivation of people who, increasingly, must work in collaboration with others in groups" (p. 427). They also reported that

studies have shown both a positive and negative relationship between diversity and group performance, which may be based upon the relationship between diversity and "the processes that groups develop that either hinder or help their performance" (p. 427). Additionally, they noted that the positive effects of group diversity on performance increases over time, eventually superseding that of homogeneous groups. They argued that racioethnic diversity influences performance indirectly through its impact on group efficacy and group cohesion.

Sargent and Sue-Chan's (2001) study, conducted in a Canadian university with a sizeable Asian population, as was this study, used Blau's (1997) index of heterogeneity, which varies from a low of 0 (total homogeneity) to 1 (total heterogeneity), defined as follows:

$$\text{Heterogeneity} = (1 - \sum P_i^2),$$

where P is the proportion of group members in a category and i is the number of different categories represented in a group. This formula was used to study the effects of diversity on individual DMTP.

Summary

The research literature has shown that conceptual data modeling is a complex task requiring the use of the project-based team approach. Teaching novices in the art and practice of conceptual data modeling is itself a complex process in need of continuing research. Research has found that teams are extensively used in the workplace and educational settings. Although much has been done with regard to the employment of project-based teams as a pedagogical tool, much remains to be done, especially because most database courses assign some type of team database project. Researchers have identified team dynamics and team cohesion as possibly having a strong positive relationship with performance. Self-efficacy has been determined to be

a reasonably good indicator of group efficacy, at least in the short term, and both are reasonably good predictors of performance. Researchers have also demonstrated that, as teams mature, diversity has a positive effect on group or team performance over more homogeneous teams. However, uncertainty exists about what the impact of providing team dynamics training to short-duration project-based teams to assist in teaching complex conceptual data modeling tasks might be on individual data modeling tasks performance, and team cohesion. Nor is there certainty about the role of self-efficacy, gender, diversity, and team cohesiveness. Chapter 3 is a discussion of the methodology used in this study to further investigate these issues.

CHAPTER 3

METHODOLOGY

This chapter presents the methods and procedures used to evaluate the relationships between the treatment variable, team dynamics training, and the outcome variable, individual scores on tests of data modeling tasks performance (DMTP). Although students work in teams, individual responsibility is a key element in project-based team approaches; therefore, in this study individual learning outcomes were measured (Chen et al., 2004; Hayes et al., 2003; Ryan et al., 2000). The desired learning outcome was an improvement in individual DMTP.

It was anticipated that providing team dynamics training to teams prior to starting conceptual data modeling projects would affect individual DMTP outcomes. Furthermore, it was believed that self-efficacy, gender, team cohesion, and diversity could affect individual DMTP. Additionally, it was anticipated that team cohesion would be affected by team dynamics training.

Methods and procedures with regard to measuring the influence of team dynamics training on team cohesiveness and self-efficacy, and consequently their influence on DMTP, are also included in this chapter. In addition, this chapter presents the methods and procedures for assessing the variables of gender and diversity and their influence on individual DMTP. The chapter is divided into the following sections: population, sample, instrumentation and data collection procedures, data analysis, and summary.

Research Design

The research design was a quasi-experimental design using random assignment of university classes of convenience. Students who volunteered were randomly assigned to either the control or the treatment group and then randomly assigned to teams within the control or

treatment groups. Regression analysis was used to analyze the data resulting from the experiment. A fuller treatment of the regression analysis can be found under the Data Analysis Procedures heading.

The composition of the treatment, team dynamics training, was research based. Past researchers have provided team dynamics training consisting of a variety of constituent parts. For example, Elliot's (1998) team dynamics training included providing information related to team goals, roles, procedures, leadership, communications, and relationships. Kopsftein (1994) listed roles, leadership, communications, decision making, and group processes as elements of importance to team dynamics training.

Additionally, research conducted by Kozlowski, Gully, Salas, and Cannon-Bowers (1996) suggested that effective team dynamics training includes an understanding of team leadership development as it relates to team developmental stages. Scholtes (1992) stated that team dynamics training includes instruction in team stages, goals, roles, beneficial behaviors, and ground rules or norms. Others have suggested the training in a variety of group and individual behaviors or traits that group members should possess, including, but not limited to, focusing on the team goal; working toward team consensus; constructively dealing with conflict; respecting diversity; avoiding destructive actions; having interpersonal communication and coordination skills; and maintaining group identity and cohesiveness (Little, 1999; Lovgreen & Racer, 2000; Warkentin & Beranek, 1999). The team dynamics training provided in this study draws from the extensive research described above and is defined as training that facilitates team or group cohesiveness by providing information and experience with regard to intragroup considerations such as team norms, roles, responsibilities, developmental stages, and constructive and destructive behavior. The training provided was cognizant of the purposeful short-duration

nature of the experiment. It included specific impetus, information, and activities, designed to stimulate and facilitate the teams to move more quickly to the processing stage of team development.

The treatment group teams received team dynamics training via an in-class presentation narrated by the principal investigator (class instructor). The presentation lasted approximately 45 minutes inclusive of questions and answers. It included instruction regarding team norms, that is, information related to the formulation and adoption of guidelines, norms, standards, or rules by the team which could be used to help the team minimize interpersonal problems, resolve conflict, solve problems, and make decisions. To help facilitate task accomplishment, team roles and responsibilities were discussed, including the role of leader/facilitator and his or her qualifications and responsibilities; recorder who keeps a record of the team progress, assignments, and administrative requirements; and members and the expectations of team membership.

To stimulate the maturation process of the teams, information on the stages of development in the life of a team were presented. This information included searching or working through feelings of confusion and anxiety; defining or working through conflicts over what was to be done, who was to do it, and how it was to be done; identifying when team members began to identify with the team and its goals or objectives; and processing, the stage at which the group becomes a team and accomplishes the task at hand. A positive team environment was encouraged by providing information on team building behaviors, such as being supportive, confronting detrimental behavior as needed, gatekeeping or keeping the channels of communication open, mediating and harmonizing between disputing team members, summarizing to insure clarity, and process observing to insure that power and control issues did

not divert the team from accomplishing its task. Negative behaviors were discouraged through the presentation of information about possible disruptive team behaviors, for example, shutting off or cutting off the ideas of another team member through interruptions; labeling a team member's behavior, attitudes, or motivation as undesirable; or domination, manipulation, or controlling at the expense of the team effort. Appendix D is a copy of the presentation used to accomplish the team dynamics training.

To stimulate the treatment group teams to apply what they had been taught, at the conclusion of the presentation the teams were given time, approximately 15 minutes in-class time, to begin an assignment to be completed outside the class and emailed by the newly selected team leader to the class instructor within 96 hours (prior to the next time the treatment group teams were in class). The assignment required the teams to select a team name, agree on written norms, and select the individuals who would assume the roles and responsibilities of team leader/facilitator, team recorder, and members. At a minimum the team norms had to include information with regard to team meeting times, dates, and locations and behavior and attendance expectations. The recorder had to attest that agreement was reached by all team members with regard to the written norms and to provide a statement of the written norms and the names of the team members and to which roles each was assigned. It was believed that these activities would foster the teams' movement to the processing stage of team development.

The control group teams were provided placebo training on brainstorming. The training included information on what brainstorming is, how it is conducted and recorded, and the rules of brainstorming. At the conclusion of the presentation narrated by the class instructor the teams were given time to meet in class and select a team name and team leader. Prior to the next class attended by the control group teams, the team leader was required to email the professor the list

of team members, the team leader name, and the team name. Appendix H is a copy of the presentation given to the control group teams.

Population

The population consisted of university students at a North American University (Canadian) pursuing a business program requiring an information systems course in which database design components are taught.

Sample

The identified research sample included 75 students (n=75) enrolled in two sections of a required upper-level business information systems class. The students were 3rd- and 4th-year (junior and senior) School of Business students at Trinity Western University, Langley, British Columbia, Canada. Trinity Western University (TWU) is a private university of approximately 3,500 students. The TWU School of Business is one of the larger schools within the university, with an enrollment of approximately 600 students. The students were enrolled in either a bachelor of arts or a bachelor of business administration degree program. The students in each section of the class were randomly assigned to either the control or experimental group.

Teams within both the control and experimental group varied in size from 5 to 7 members. Team size has considerable impact on group phenomenon, including leadership, ingroup-bias effect, cohesiveness), groupthink, and stress (McGrew, Bilotta, & Deeney, 1999; Salas, Rozell, Driskell, & Mullen, 1999). According to Salas et al., an inverse relationship between group size and members' affinity for the group (cohesion) and group performance has been demonstrated. Additionally, Salas et al. stated that although there is no magic number “[a]s

the size of the team increases, the effectiveness of team-building interventions decreases. Optimal benefit from a team-building intervention seems most likely to be obtained with relatively small teams” (p. 324). Thus, due to the above research-based factors and additional considerations based on a variety of factors related to this study, such as class size, time investment by the student and instructor, and time to complete the experiment, a size of 5 to 7 members per team was deemed most reasonable and prudent.

Participation in this study was voluntary, and subjects were not exposed to any unreasonable discomforts, risks, or violations of their human rights. Approval to conduct this study was obtained from the Institutional Review Board at the University of North Texas (see Appendix A). By requirement of the review board, the participating organization, the Trinity Western University Research Ethics Board, also signed a Certificate of Approval (see Appendix B).

Instrumentation and Data Collection Procedures

Whenever possible, this study used instrumentation which has been previously utilized, also the reliability and validity of the scores have been adequately demonstrated by past researchers. When it was necessary to modify an instrument, the modifications were minimal. Summarized below are the specific areas measured, including self-efficacy, team cohesion, individual DMTP, gender and diversity, and the corresponding instruments utilized.

Self-efficacy (SE) Following the procedures outlined by Ryan et al. (2000), this study used a task-specific survey recommended by Bandura (1994). According to Bandura, measures of self-efficacy include both self-efficacy magnitude and strength. Ryan et al. used the research of Lee

and Bobko (1994), who analyzed five common ways in which self-efficacy is operationalized, and concluded that “a composite measure of self-efficacy magnitude and strength showed the highest convergent and predictive validity” (p. 16). Lee and Bobko stated that self-efficacy magnitude should be assessed by asking the respondents whether they believe they can carry out the tasks: yes or no. Self-efficacy strength is determined by asking the respondents how confident they are that they can accomplish the tasks. Lee and Bobko’s approach to measuring self-efficacy has been used, and score reliability and validity have been tested by numerous researchers (Baker, 2001; Mulvey & Ribbens, 1999; Sargent & Sue-Chan, 2001; Whiteoak, Chalip, & Hort, 2004).

Consistent with these findings, this study, as did that of Ryan et al. (2000) measured self-efficacy magnitude by asking the subjects to indicate whether they believed they could achieve a grade of 60% (Canadian universities use a 4.30 scale which includes plus and minus grades, and a mark of 60% is equivalent to a C- grade) on the Entity-Relationship diagramming tasks (yes or no). Self-efficacy strength was assessed by asking the respondents to state on a scale from 0 to 10 their degree of confidence in their ability to achieve a grade of 60% (see Appendix I, Self-Efficacy Survey). However, individual self-efficacy strength was used for regression analysis to determine the overall effect of LM on self-efficacy; as prescribed by Lee and Bobko (1994), the raw scores of self-efficacy strength were summed across the self-efficacy levels that were answered “yes,” resulting in a total of 406 (61 samples) or a per sample strength of 6.7 compared to a total of 33 (12 “no” samples) or a per sample strength of 2.7 for those who answered “no.” The number of samples who responded to the self-efficacy questionnaire (73) is smaller than $n = 75$, due to missing data. Coefficient alpha was .65 for this measure.

Team Cohesion (TC) This study followed the rationale of a well-validated and reliable team scores obtained instrument, the Group Environment Questionnaire (GEQ) (Brawley et al., 1987; Carron, Widmeyer, & Brawley, 1985; Widmeyer et al., 1985), which is in agreement with the Carron, Brawley, & Widmeyer (1998) operational definition of cohesion. Widmeyer et al. (1985) conducted extensive research to attest to the reliability and content validity of the scores obtained using the GEQ. They found that “ATG-T, ATG-S, GI-T, and GI-S [all discussed below] had reliability coefficients of $r = .75, .64, .70, \text{ and } .76$, respectively” (Widmeyer et al., 1985, p.30). They also undertook extensive research to attest to content, concurrent, predictive, and construct validity of the GEQ scores through a series of studies in order to conduct factorial analysis, comparison with other cohesiveness, and related measurement instruments. The reader is referred to the original monograph for a complete statement of the extensive efforts undertaken by Widmeyer et al. The five questions used on the team questionnaire in this study were similar to GEQ, especially with regard to GI-T (which consists of 5 out of 18 questions on the GEQ and is the measure of interest to this study) but were altered to specifically fit the data modeling task. The team questionnaire modifications are of the nature, “We all take responsibility for any (loss or) poor performance by our team on this project,” where the bracketed words omitted from the original and underlined words are words added to the questionnaire used in this study.

The original GEQ was developed to measure sports team cohesion. The two major types of cohesion measured by the GEQ are individual attractions to the group, representing "the individual's perceptions about personal motivations acting to retain him or her in the group" and group integration, representing the "individual's perceptions about the closeness, similarity, and bonding within the group as a whole" (Carron et al., 2004, p. 468). According to Carron et al., the two orientations to a group member's perceptions about group cohesion are task and social;

thus, the GEQ is used to measure four manifestations of cohesion: "group integration–task (GI-T), group integration–social (GI-S), individual attractions to the group–task (ATG-T), and individual attractions to the group–social (ATG-S)" (p. 468).

Due to the short duration of the experiment (2 weeks) only the dimensions of GI-T and ATG-T are of significance. It is unlikely that cohesion related to social aspects was sufficiently developed to be of significance because the teams had little time for socialization outside of team meetings to accomplish task-specific requirements. Furthermore, it was theorized that, consistent with the findings of Widmeyer et al. (1985), GI-T is greater than that of ATG-T due to the nature of the task and time constraints. Thus, GI-T is of more value as an indicator of team cohesiveness in the context of this study and was used as the indication of treatment effect or team dynamics training and as the predictor of DMTP related to team cohesion. Consistent with the treatment of self-efficacy, individual measures of GI-T were used in the regression analysis.

Data Modeling Tasks Performance (DMTP) To assess data modeling tasks performance, the case that Ryan et al. (2000) adapted from a case scenario developed by Kroenke (1992) was utilized. See Appendix C for the one-page case scenario. The situation required a database for a heavy equipment manufacturer in order to measure the effectiveness of its product advertisements. The subjects were given 45 minutes to create a normalized entity-relationship diagram (ERD) based on the case scenario. A scoring matrix (see Appendix E) was used to mark the exams, giving points for identification of entities, entity identifiers, relationships, cardinalities, and attributes. Two graders, I and a computing science teaching assistant at Trinity Western University, evaluated the ERDs. I, the principal investigator, who has graded numerous such tests in the past, provided the teaching assistant with sufficient training and information about the class

lecture and assignment expectations needed to accurately score the test. The interrater reliability was determined to be .863. The average of the exam scores across the two graders was used as the measure of the dependent variable. The maximum possible score on the exam was 100.

Gender and Diversity A demographic survey (see Appendix F) was used to collect demographic information from the participants. In particular, diversity within the teams was analyzed using "Blau's (1997) index of heterogeneity," which varies from a low of 0 (total homogeneity) to 1 (total heterogeneity), defined as follows (p. 435):

$$\text{Heterogeneity} = (1 - \sum P_i^2),$$

where P is the proportion of group members in a category and i is the number of different categories represented in a group. Blau's formulation was used in this study to trace the effects of diversity on self-efficacy and team cohesion.

Timeline for the Experiment At the beginning of the conceptual data modeling module, which started on the 5th class day, the instructor provided the subjects an overview of the experiment. Students were told that the purpose of the study was to investigate various aspects of learning, but they were not told whether they would be assigned to the control or the experimental group. Each participant was asked to sign a consent form (see Appendix A) agreeing to participate in the study and to be present as required at all class sessions for the duration of the study. Students were permitted to withdraw from the study if desired. Those students who did not wish to participate in the experiment were given the option to complete an alternate assignment. However, all students agreed to participate in the study. Subjects were then randomly assigned to the control or treatment groups and subsequently randomly assigned to teams within the

respective groups. The students in the control group were told not to be present during the next class period (6th class day). During the sixth class period the treatment group was provided team dynamics training and required to select a team leader/facilitator; establish team norms; goals, meeting times and locations; and select a team name. At the conclusion of the class the treatment group was told not to be present during the next class period (7th class day). During the seventh class period the control group was provided placebo training on how to brainstorm (see Appendix G) and then told only to select a team leader and a team name. During the class periods when students were not present they were told to use the time to read the chapter in the textbook related to database modeling and design.

Finally, during the eighth class period, when all students and teams were present, the instructor reviewed the chapter material, and the team database project (Appendix H) was assigned and described. Post treatment measures of self-efficacy and team cohesion were conducted prior to the administration of the posttest data modeling tasks at the conclusion of the experiment.

Data Analysis Procedures

It was anticipated that the experiment design complied with regression assumptions; however, appropriate descriptive statistical analyses were accomplished to attest to assumption with regard to errors.

Summary

The purpose of this study was to investigate the impact of providing team dynamics training to teams prior to the commencement of short-duration conceptual data modeling projects to determine whether such training enhances individual data modeling task performance (DMTP). Treatment teams were provided team dynamics training utilizing a presentation covering roles and responsibilities, stages of team development, and constructive and destructive behavior as well as activities to stimulate team maturation. Placebo presentation-based brainstorming training was provided to the control teams. An abbreviated timeline was followed in keeping with the short-duration aspect of the experiment. Data were gathered through a variety of instruments whose validity and reliability of the scores obtained have been research tested. Based on the theoretical considerations of the model, regression was used to test the hypotheses. Chapters 4 and 5 of this study report the results of the data analysis, discuss the significance of the findings, and provide recommendations for future research.

CHAPTER 4

FINDINGS

The Purpose of the Study

The purpose of this study was to investigate the impact of providing team dynamics training to teams prior to the commencement of short-duration conceptual data modeling projects. Based on the theoretical considerations of the model, other variables of interest were also identified. This chapter is organized into three sections. The first section discusses the participants in the study, the second section discusses the data and the statistical analysis conducted, and the last section is a discussion of the hypotheses in light of the data and the analysis of the data.

Participants in the Study

All of the 75 students enrolled in two sections of a 3rd- and 4th-year course in business information systems in the Trinity Western University School of Business volunteered to participate in this study. A high percentage (44 out of 75, or approximately 59%) of the students participating in the study were English as second language (ESL) students. The seven different first languages reported by the students in the order of frequency were Chinese Mandarin (n=37), English (n=31), Chinese Cantonese (n=2), Japanese (n=2), and n=1 each for Korean, Indonesian, and Punjabi. The School of Business at Trinity Western University has approximately 600 full-time students, approximately 50% of whom are ESL students. The 75 students were assigned to a total of six teams in each class, with three teams in each class assigned to the control and experimental groups, respectively. Teams ranged in size from 5 to 7 members.

Study Data and Statistical Analysis

This research design was a quasi-experimental design of convenience. Students who volunteered were randomly assigned to either the control or treatment groups and then randomly assigned to teams within the control or treatment groups. Regression was used to analyze the data resulting from the experiment. The data were coded and entered by myself and were analyzed using SPSS® 13.0, statistical processing software. Learning Mode (LM) or the treatment variable of team dynamics training was coded as 0 for no treatment or training and 1 for treatment. Gender (GEN) was coded as 0 for male and 1 for female. Team diversity (TD) was calculated using Blau's formula, resulting in possible values between 0 (a perfectly homogenous team) and 1 (a perfectly heterogeneous team). The descriptive statistics indicate that the number of students not receiving training was slightly higher than the number receiving training, that a majority (55%) of the samples were female, and that no teams were perfectly homogenous or perfectly heterogeneous (see Table 1). The highest possible score for team cohesion (TC) score was 50, with 35.60 the average in this study. The highest possible self-efficacy (SE) score was 10, and the average in this study was 6.17. The highest possible data modeling task performance (DMTP) score was 100, with an average of 49.77 in this study. Missing data analysis of seven samples with missing self-efficacy, team cohesion, or both scores was conducted, and due to the negative skewness of both measures, the mode was utilized to replace missing data, resulting in a total of 75 samples. An examination of the descriptive statistics indicated that, while the kurtosis for team cohesiveness was outside the normal bounds, transformation (square root, logarithm) of the data resulted in the kurtosis not coming closer to the acceptable range of ± 1 . Examination of the residual plots verified compliance with the assumption of homoscedasticity (see Figure 2).

Table 1

Descriptive Statistics

	<i>N</i>	Mean	Median	Min	Max	Mode	Skewness	Kurtosis
Learning Mode (LM)	75	0.48	0.00	0.00	1.00	0.00	0.08	-2.05
Gender (GEN)	75	0.55	1.00	0.00	1.00	1.00	-0.19	-2.02
Team's Diversity (TD)	75	0.46	0.45	0.25	0.78	0.44	0.46	0.24
Self-Efficacy (SE)	75	6.17	6.00	2.00	10.00	6.00	-0.34	-0.07
Team Cohesion (TC)	75	35.60	37.00	17.00	45.00	37.00	-1.11	1.31
Data Modeling Task Performance (DMTP)	75	49.77	49.74	8.00	98.00	50.00	-0.10	-0.63

Scatterplot

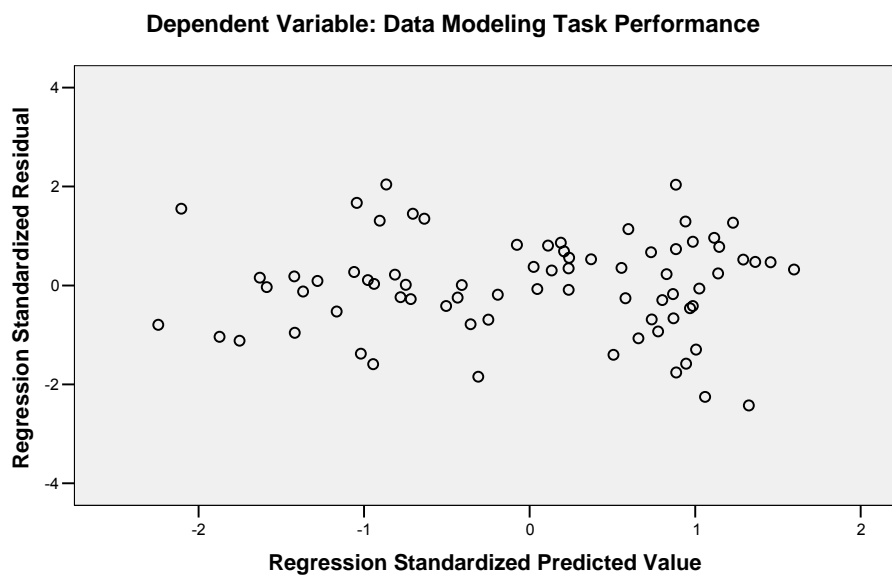


Figure 2. Standardized residuals predicted value.

Analysis of Hypotheses

Regressions were performed in order to analyze the hypotheses. For the sake of completeness the results of the analysis, for example, R , R^2 , B , β , r_s , r_s^2 , and p , are included in the appropriate tables.

H₀1: There is no statistically significant relationship between learning mode, gender, team diversity, self-efficacy, and team cohesiveness, and individual data modeling task performance.

The regression of individual DMTP on LM, GEN, TD, SE, and TC indicates that the model was a reasonably good predictor of the variation in DMTP, because the regression model was statistically ($p < .0001$) and practically ($R^2 = .315$) significant (see Table 2). The adjusted R^2 (.265) also indicates that minimal sampling error was involved in the analysis. Therefore, this study rejected the null for the first hypothesis.

Table 2

Regression Analysis Results for Predicting Individual DMTP

	R	R^2	Adjusted R^2	B	β	p	r_s	r_s^2
Model	.561 ^a	.315	.265					
Constant				19.653		.236		
Learning Mode (LM)				-25.755	-.602	.000*	-.747	.558**
Self-Efficacy (SE)				1.416	.132	.204	.318	.101**
Team Cohesion (TC)				.210	.057	.573	.070	.005
Gender (GEN)				.747	.017	.871	.144	.020
Team Diversity (TD)				56.295	.380	.002*	.165	.027

Note. F_{calc} for regressing DMTP on LM, TC, SE, GEN and TD is 6.336; $p < .001$

*statistically significant at $p < .005$; **statistically significant at $p < .001$

This analysis answers the first research question because the identified set of predictor variables accounted for 31.5% of the variance in predicted DMTP. However, because all

variables in the model were not perfectly uncorrelated (see Table 3), an analysis of beta weights and structure coefficients (see Table 2) was also performed. Structure coefficients were calculated by computing the correlation between the respective dependent variables and the individual DMTP variable predicted by the regression formula (see Table 3). An examination of the beta weights alone indicates that LM and TD received the largest credit, with -.602 and .380, respectively.

Table 3

Correlation Coefficients Among Observed Variables and Synthetic Predicted Variable

	DMTP	LM	GEN	TD	SE	TC	Yhat
DMTP	1.000	-.419**	.081	.092	.178	.039	.561**
LM	-.419**	1.000	.124	.487**	-.030	-.012	-.747**
GEN	.081	.124	1.000	.275*	.227	.061	.144
TD	.092	.487**	.275*	1.000	.048	-.106	.165
SE	.178	-.030	.227	.048	1.000	.104	.318**
TC	.039	-.012	.061	-.106	.104	1.00	.070
yhat	.561**	-.747**	.144	.165	.318**	.070	1.000

**statistically significant at $p < .001$

They are also the only two statistical significant regression equation variables. An examination of beta weights and structure coefficients indicates that not only was LM the primary contributor to the regression equation, it also accounted for 55.8% of the synthetic predictor variable.

However, an analysis of the structure coefficients for TD indicates that it accounted for very little (2.7%) of the synthetic predictor variable and was not statistically significant. It is of interest that TD's (team diversity's) correlation with LM (learning mode) was .487 and statistically

significant. It can also be observed that whenever TD was removed from the regression, the R^2 value (see Table 4) decreased approximately 33%. TD was thus suppressing what otherwise would be error variance. As Howell (2002) outlined, TD is a classical suppressor variable resulting in the relatively large beta weight but low structure coefficient.

Table 4

Model Summary with TD Removed

Model	R	R^2	Adjusted R^2
	.462	.213	.168

SE, with a beta weight of .132 and a structure coefficient that indicates it accounts for 10% of the synthetic predictor variable, appeared to make a small contribution to the prediction. SE was not strongly correlated with any of the variables (see Table 3). There was a small amount of correlation with GEN, and DMTP, and if SE is removed from the regression then the resulting change in R^2 (see Table 5) was very small; therefore, SE was not acting as a suppressor variable. The presence of the suppressor variable (TD) complicated analysis. However, comparison of R^2 of SE in the model (see Table 2) and not (see Table 5) indicated that SE not only did not help the regression equation but probably introduced sampling error.

Table 5

Model Summary with SE Removed

Model	R	R^2	Adjusted R^2
	.561	.314	.275

H₀2: There is no statistically significant relationship between LM and team cohesiveness.

In this study, scores on the team questionnaire (used to measure beliefs about team cohesiveness) (Brawley et al., 1987; Carron et al., 1985; Widmeyer et al., 1985), indicated the degree of team cohesiveness (TC). A correlation between LM and TC in this study would have indicated LM predicted the perception of team cohesion as measured by the team questionnaire scores. TC and LM were very minimally correlated (see Table 3). Therefore, this study failed to reject the null for the second hypothesis.

Summary

The purpose of this study was to investigate the impact of providing team dynamics training to teams prior to the commencement of short-duration conceptual data modeling projects to determine whether such training would enhance individual data modeling task performance (DMTP). Based on the theoretical considerations of the model, regression was used to test the hypotheses. An analysis of the data resulted in the rejection of the null for H₀1 and the failure to reject H₀2. Chapter 5 provides a discussion of the significance of the findings and recommendations for future research.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Summary of Findings

Based on the statistical analysis conducted, the null hypothesis was rejected for H_01 , but not for H_02 . The following section of this chapter contains a discussion of the results of the analysis, followed by implications and recommendations for future research.

Discussion of the Results

The analysis of the data (see Appendix J) in this study indicated that LM or the treatment variable of team dynamics trainings, when considered as part of the set of predictor variables, was able to predict the variation in DMTP. However, it is to be noted that in this study the regression coefficient is negative, indicating that team dynamics training appears to have had a dampening effect on DMTP. The finding of a negative correlation of LM, or team dynamics training, and individual DMTP, or the outcome variable, was not anticipated.

Ryan et al. (2000) indicated that team based projects do not significantly affect the learning outcome and specifically challenged the traditional assumption that the project-based team approach is of value in short-duration learning situations and in particular conceptual Data Modeling Task Performance (DMTP). They suggested that additional research into the impact of training with regard to intragroup considerations that can affect team cohesiveness needed to be investigated. Lovgren and Racer's (2000) research supported this recommendation, finding that while teams in the workplace have time to develop, teams in the classroom often do not have the luxury of adequate time to develop and that students need faculty emphasis on team

dynamics. Lovgren and Racer found that it is ineffective for students to learn group dynamics through a passive process of learning while doing. They contended that perhaps with the right team dynamics information, training, and impetus student project-based teams could achieve greater levels of competency. Thus, the intent of this study was to fill a need for further investigation into the impact of providing team dynamics training to teams prior to the commencement of short-duration conceptual data modeling projects.

It was anticipated that the provision of team dynamics training would have a positive or facilitating correlation with individual DMTP and not a negative effect as found in this study. Variables which were not identified could account for this result or perhaps the interaction, not investigated in this study, between subsets of the identified variables may have led to this result. Variables not investigated include pretraining motivation, existing cognitive abilities, prior database knowledge, prior exposure to the class (Canadian universities permit students to retake classes they do not pass without limit until they eventually make a passing grade, and the previous grades are excluded from their GPA calculation), and distribution of the workload. It was believed that the random assignment of students to either the treatment or control group and subsequent random assignment to teams would reduce the impact of such variables, specifically pretraining motivation and cognitive abilities. Additionally, a prerequisite for enrolling in this particular class is completion of 2 ½ semester-hour modules of database software familiarization. However, no data were gathered on any of these preexisting variables.

Furthermore, while I encouraged all teams to share both the workload and the learning experience involved in the assigned database project, the experimental design did not specifically control for this factor. It is possible that 1 or 2 students who were very knowledgeable in database design completed most of, or the entire, team database project. Team dynamics training

for the experimental group might even have fostered this particular behavior. Therefore, the impact of this variable cannot be measured or ruled out.

Also of interest both to this study and to future studies is the possibility of subtle and unaccounted-for interactions between identified variables such as the suppressor effect of team diversity discussed in chapter 4. During the process of conducting this study, I was informed by students who spoke English as their first language that they were unhappy with being randomly assigned to teams largely comprised of students who did not have English as their first language because they felt they would have to carry an unfair amount of the workload. Conversely, believing they would be at a disadvantage, students who did not speak English as their first language complained about being randomly assigned to teams comprised solely of students who did not speak English as their first language (there was no case of a team with all students who spoke the same first language). The impact of language-based individual perceptions was not accounted for in this study.

Thus, the fact that 59% of the students participating in this study were ESL students, and the possibility that variables believed to be controlled by random assignment may not have been, might in some unidentified manner have contributed to the unanticipated finding that learning mode, or the provision of team dynamics training, thought by some researchers (Lovgren & Racer, 2000; Ryan et al., 2002) to be a positive factor, appears not to be the case, at least in this study of intentionally very short duration, 2 class weeks, from treatment to measurements. On the other hand, in view of previous research, the finding that team diversity had a positive correlation with individual DMTP would be reasonable, especially in a longer term situation. Sargent and Sue-Chan (2001) reported that studies have shown both a positive and negative relationship between diversity and group performance, which may be based on the relationship

between diversity and "the processes that groups develop that either hinder or help their performance" (p. 427). Additionally, they reported that the positive effects of group diversity on performance increases over time, eventually superseding that of homogeneous groups. They argued that racioethnic diversity influences performance indirectly through its impact on group efficacy and group cohesion. However, it is surprising that in the explicitly short duration focus of this study the more heterogeneous a team, the higher the scores on individual DMTP. The findings with regard to the negative correlation between team dynamics training and DMTP and a positive correlation with team diversity and the parallel examination of the beta weights and structure coefficients suggest that additional research is required.

Similar to Elliot's (1998) study, this study did not find a statistically significant relationship between team dynamics training and team cohesiveness. The lack of correlation in this study might be attributed to interrelated but countervailing factors. The team training treatment may have contributed to a greater awareness of how a team should function among those teams provided training. The well-known Hawthorne Effect might be one possible contributing factor. Some individuals on teams given the team dynamics training might have surmised that they were being studied and had "new" knowledge on which to base their responses on the team questionnaire. Thus, the treatment teams may have had some members who were more critical in their assessment of factors indicative of high cohesiveness. Coupled with this is the finding of Widmeyer et al., (1985) during their study that there was some evidence "that longstanding athletic team members [have] . . . a different view of cohesion than a new team member" (p. 43). It is possible that the short duration of the study, 2 class weeks from team training to the conclusion of the team project and the administration of the questionnaire, to some extent may have arrested the development of the team life cycle. The abortive nature of

the study coupled with the heightened awareness of team dynamics may have combined to produce this result.

Additionally, Widmeyer et al. (1985) suggested that “another cognition that may be affected by cohesion is the achievement outcome attribution” (p. 45). There is the possibility that, because the team questionnaire was conducted on the day the team database project was turned in and the individual DMTP was to be immediately administered after completing the questionnaire, a team member’s appreciation or perception of how well the team had done on the project influenced the perception of cohesion. Widmeyer et al. stated that “it can be suggested that motivation to protect or maintain self-esteem is one reason that an egocentric or apparently self-serving bias encourages less assumed responsibility for failure on the part of members of low-cohesive teams” (p. 46). Of special importance to this study is that Widmeyer et al. were specifically concerned with the team cohesion constructs of interest in this study. Therefore, it is possible that due to unaccounted for self-ego influences some team members’ evaluations of team cohesion were unknowingly affected by their perceptions of how well the team had performed on the team project and how well they would individually perform on the DMTP. All of these possibilities provide ample opportunity for further research efforts.

Implications

The findings of this study indicate that the return on student and professor resources investment through providing team dynamics training to teams prior to the commencement of very short duration conceptual data modeling projects may not be worth the enhancement effect on learning outcome. In fact, it was found that individuals on teams who had team dynamics training did more poorly than those members of teams who did not have team dynamics training.

This study calls into question the value of team dynamics training on learning outcomes in the case of very short duration project-based teams involved in conceptual data modeling tasks.

However, the research literature is not as conclusive.

Some researchers have identified a need for more emphasis on team dynamics training within the university-level curriculum specifically to develop teamwork knowledge, skills, and attitudes in university curricula (Chen, Donahue et al., 2004) alongside of, or in spite of, the apparent pedagogical value involved with the specific task or subject matter learning. Chen et al. believed that it is important to employ "active instructional strategies when developing teamwork . . . such as having students participate in various team exercises" to better prepare students for the transition from the university to the workplace (p. 37). In the United Kingdom, the Enterprise in Higher Education (EHE) initiative was developed to provide transferable team dynamics skills as well as the academic content of what students were studying (Humphreys et al., 1997). Lovgren and Racer (2000) even suggested that teaching team dynamic skills might be as important as teaching specific discipline-related skills. This is coupled with their belief that teaching team dynamic skills is important in countering "traditional emphasis on individualistic achievement in university-level curricula [which] still prevails" (Chen et al., 2004, p. 28).

It must also be emphasized that this study was implicitly focused on very short duration project-based teams, and any attempt to generalize the results must be tempered by the extremely short time span involved – 2 class weeks. This time span is short even in the context of a normal semester within the common university curriculum. The findings of this study suggest the need for continued research into the role of other variables when deciding whether there is learning outcome utility in providing team dynamics training to short-duration project-based teams. However, it must also be emphasized that any attempt to generalize from this study is limited by

the sample, a sample of convenience at a School of Business with a 50% ratio of ESL students within a small private university in Canada, and that the situation was task specific, a team-based project conceptual database modeling task of very short duration.

Recommendations for Future Research

This study has raised more questions than it has answered. Perhaps the most basic question is Why did the study uncover a negative correlation between team dynamics training, or learning mode (LM), and individual DMTP? Additional research in this area would need to clarify what about this particular experiment might have contributed to these results. Was it the very short duration focus? What was the influence, if any, of the high ratio of ESL students in the sample? What, if any, was the impact of unidentified or uncontrolled-for variables or subtle uninvestigated interactions between identified variables?

A secondary set of questions centers on the surprising result related to the team diversity. The study implies that the more heterogeneous the team the higher the individual DMTP. When the research literature indicates the opposite correlation – in the very short term the more homogeneous the team the more productive (Sargent & Sue-Chan, 2001) – why did this study find that, the more heterogeneous the team, the higher the individual DMTP? Again, the reasons for such a finding in this particular study require further investigation. The exact nature of the heterogeneity within and between the teams which produced this result is worthy of consideration. Is the correlation related primarily or solely to the fact that team diversity might be acting as a classical suppressor variable, and, if so, why? Or is the correlation related to the fact that the more heterogeneous teams fostered a more equal division of labor and participation

in the team database project due to the need to work more closely in dealing with intragroup communications issues?

Another avenue of future research would be the possibility that a different experimental model, theoretical model, and/or statistical analysis methodology might provide additional insight into the essential question of whether it is worth the investment in student and instructor time to include team dynamics training for team projects. The time duration of the experiment might be significantly increased and the effects reinvestigated. Perhaps insight could be provided by a theoretical model similar to Figure 3, in which gender and language are believed to be individual antecedent variables influencing self-efficacy and individual DMTP, and gender mix and diversity are viewed as group antecedent variables influencing team cohesiveness.

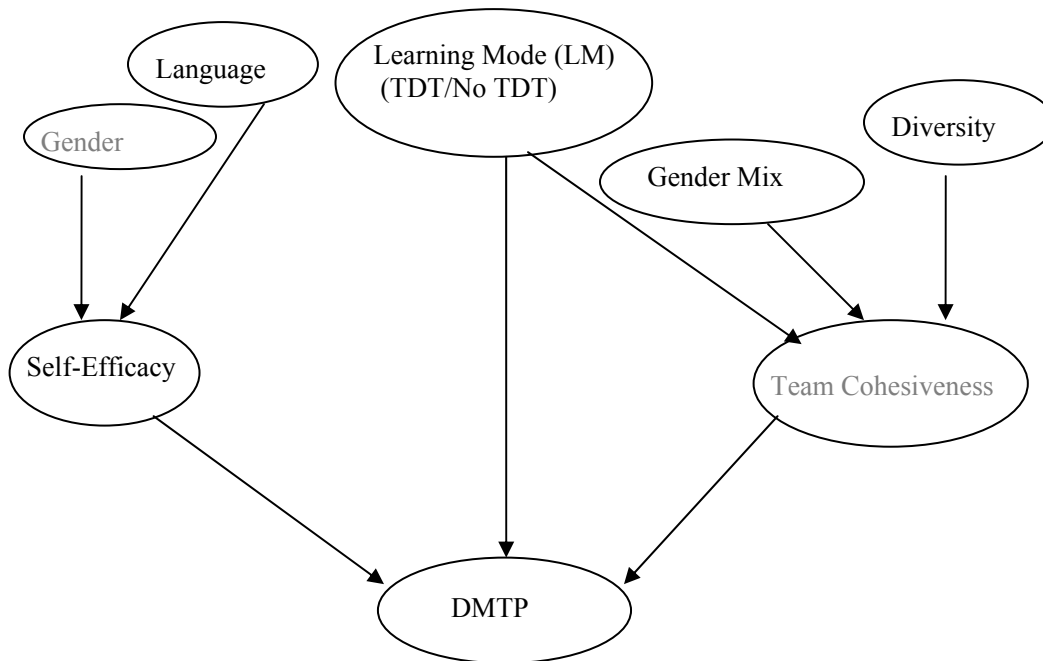


Figure 3. Alternative model.

Gender is a dichotomous individual variable, with 0 Male, 1 Female

Gender Mix is a continuous variable using Blau's formulation ranging from 0 (all male or female team composition) to .5 (equal mix of male and female on team)

Language is individual dichotomous 0 English Native Language, 1 English Second Language

Diversity is continuous variable using Blau's Formulation ranging from 0 (all speak the same native language to 1 all speak different native languages)

An experiment could be conducted with sufficient samples to do path analysis to gain additional insight into which combination of exogenous and endogenous variables provide the strongest correlative path with regard to individual DMTP.

Additional research could perhaps answer some of the questions posed, thereby providing university faculty with additional insight into the value of providing team dynamics training to teams to further learning outcomes. This study has shed some light, but many questions remain. The essential question remains is In which situations is it worth the effort to invest the resources, both instructor and student, in team dynamics training?

APPENDIX A
UNIVERSITY OF NORTH TEXAS
HUMAN SUBJECTS APPROVAL

University of North Texas
Institutional Review Board
Research Consent Form

Subject Name _____ Date _____

Title of the Study:
The Effect of Team Dynamics Training on Conceptual Data Modeling Tasks Performance

Principal Investigator: Ricky Menking, Associate Professor School of Business Trinity Western University

Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the purpose and benefits of the study and how it will be conducted.

Purpose of the Study

The purpose of this study is to investigate the impact of providing various types of training to teams prior to the commencement of a short duration team database design project to determine if such training will enhance individual database design task performance. This study is being conducted as part of the dissertation requirements for the PhD degree at University of North Texas.

Description of the Study

This study will involve student volunteers being placed into teams for the duration of those activities which are part of the study of the affect of different types of training on individual database design task performance.

Procedures to be used

Student volunteers will be randomly assigned to teams. All teams will complete the same tasks. Demographic information related to gender and first language or mother tongue will be gathered. At the conclusion of the team project, surveys of individual student confidence in their ability to perform well on a data modeling task and beliefs about team unity will be completed and a data modeling task performance quiz administered.

Description of the foreseeable risks

There are no known or foreseeable risks associated with this study.

Benefits to the subjects or others

At the conclusion of this study, all students will be afforded the same training. All students who request it will be provided a copy of the study results. This study should benefit university professors and students involved in short duration projects by providing a fuller understanding of the value of various types of training on individual database design performance.

Time Commitment

This project is expected to take a time commitment of 20 minutes beyond what you would normally spend on work in this course.

Procedures for Maintaining Confidentiality of Research Records

A coded number will be used to represent a team and a student. Names and/or student numbers will not be linked to any study documents with the exception of this consent form. All study instruments will be kept in the investigator's office in a locked file cabinet.

Review for the Protection of Participants

This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3940 or sbourns@unt.edu with any questions regarding the rights of research subjects.

Research Subject's Rights

I have read or have had read to me all of the above.

Rick Menking, the investigator, has explained the study to me and answered all of my questions. I have been told the risks and/or discomforts as well as the possible benefits of the study.

I understand that I do not have to take part in this study and my refusal to participate or my decision to withdraw will involve no penalty or loss of rights or benefits. The study personnel may choose to stop my participation at any time.

Individuals who choose not to participate in this study, as part of the normal requirements of this course, will still have to complete the same database analysis task requirements and quiz as those students who choose to participate in the study. They will not however, be required to complete the demographic information related to gender and first language or mother tongue, self-efficacy and team cohesion surveys.

In case I have any questions about the study, I have been told I can contact Rick Menking, School of Business, rick.menking@twu.ca or 604 888-7511, Ex. 3433. I also have been told that if I have any questions about ethical issues involved in this project I may contact Sue Funk at sue.funk@twu.ca or 513-2142 at Trinity Western University, or Dr. Mickey Wircenski, (940) 369-7704, University of North Texas, College of Education, Applied Technology, Training, and Development.

I understand my rights as a research subject and I voluntarily consent to participate in this study. I understand what the study is about, how the study is conducted, and why it is being performed. I have been told I will receive a signed copy of this consent form.

Signature of Subject

Date

For the Investigator or Designee:

I certify that I have reviewed the contents of this form with the subject signing above. I have explained the known benefits and risks of the research. It is my opinion that the subject understood the explanation.

Signature of Principal Investigator

Date

APPROVED BY THE UNT IRB
FROM 7/28/05 TO 7/27/06
SB

APPENDIX B
TRINITY WESTERN UNIVERSITY REB
CERTIFICATE OF APPROVAL



TRINITY WESTERN UNIVERSITY
Research Ethics Board (REB)
CERTIFICATE OF APPROVAL

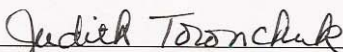
Principal Investigator: Rick Menking
Departmental Affiliation: Trinity Western University, School of Business
(Project to be carried out within the School of Business at TWU)

Title: The Effect of Team Dynamics Training on Conceptual Data
Modeling Tasks Performance

Project No.: 05F06
Start Date: 02/01/2006
End Date: 05/18/2006
Approval Date: July 1, 2005

Certification

This is to certify that Trinity Western University Research Ethics Board (REB) has examined the research proposal and concludes that, in all respects, the proposed research meets appropriate standards of ethics as outlined by the “Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans”.


Judith Toronchuk, PhD.
REB Chair

**This Certificate of Approval is valid for one year and may be renewed.
The REB must be notified of all changes in protocol, procedures or consent forms.
A final project form must be submitted upon completion.**

APPENDIX C

ENTITY RELATIONSHIP DIAGRAM TASKS

Entity Relationship Diagram Tasks Quiz

Draw a normalized entity-relationship diagram for the scenario given below. Make sure you:

- Identify the entities in this situation
- Determine the identifier for each entity
- Label the relationships
- Indicate the cardinality of the relationship
- Give examples of additional attributes that might be associated with each entity
- STATE ANY ASSUMPTIONS THAT YOU MAKE

Oakland Manufacturing Company manufactures and sells heavy equipment for the construction industry. Advertising is the marketing manager's, Jane, largest budget item. She therefore wants to be able to measure the effectiveness of the ads she runs. Jane intends to have a database developed for this purpose. Assume you are hired for the job. Your first task is to develop the conceptual schema (Entity-Relationship diagram).

Oakland's products include bulldozers, graders, loaders, drilling rigs, and the like. All products have unique product identifiers, but they are also often referred to by product name. Each product is assigned a yearly sales quota (assume only the current year's sales quota will be stored.). Actual product sales, however, are recorded on a weekly basis.

Product ads are designed by outside agencies. A given agency can design numerous product ads but a specific ad is designed by only one agency. Each ad can incorporate one or more than one product. Each ad is given a unique ID number and name. Oakland also wants to record the date that the ad was created. Any specific ad can appear in various publications on various dates. The publication can either be a newspaper or a magazine. If the publication is a newspaper, the section number and the page number where the ad was placed must be recorded. In addition, the day of the week that the ad was run must also be recorded. If the publication is a magazine, the volume number and issue number of the magazine must be recorded.

Oakland's ads always contain a mail-in "Request for Information" card for the prospective customers. The card contains provisions for only one prospective customer's name (and address). The same card, however, can be used to request information for more than one product. Each card has a unique preprinted number that can also be used to identify the ad and the publication that generated a particular lead.

APPENDIX D
TEAM DYNAMICS TRAINING

The following is the presentation in outline form used to provide Team Dynamics training to the experimental or treatment group.

Team Dynamics
TEAMWORK!

OVERVIEW

OBJECTIVE

WHAT MAKES A GROUP A TEAM?

TEAM NORMS

TEAM ROLES AND RESPONSIBILITIES

STAGES OF TEAM LIFE

TEAM BUILDING BEHAVIORS

WHAT IS TEAMWORK?

T ogether It is the fuel that allows

E veryone common people to attain

Achieves uncommon results.

M ore

Simply stated, it is less me and more

WE!

Team Dynamics
TEAM NORMS

Guidelines/norms or standards agreed to by the team
Used to minimize team interpersonal problems
Norms or Rules for issues like
How team members will treat each other
Making decision
Resolving conflict
Solving problems
Attendance
Meeting

Team Dynamics
TEAM ROLES & RESPONSIBILITIES

Leader/facilitator

- Leads the team through the project
- Contributes equally with members on tasks, activities and decisions
- May be chosen for teams skills, experience and/or knowledge of the project
- Can function as a mentor/coach and is concerned with team progress
- Helps to keep team focused
- Helps to prevent anyone from dominating or being overlooked

Team Dynamics
TEAM ROLES & RESPONSIBILITIES

Recorder

- Keep accurate records of team progress and assignments
- Sees to administrative requirements of team project

Members

- Most important role on team
- Comes to all called meetings
- Accomplish all assigned task
- Engages in team building behavior and avoids team destructive behavior

Team Dynamics
TEAM Development Stages

STAGE 1: SEARCHING

A NEWLY FORMED TEAM IS IN THE SEARCHING STAGE. THIS STAGE IS CHARACTERIZED BY:

- CONFUSION OVER ROLES THAT EACH PERSON WILL PLAY
- CONFUSION ABOUT THE TASKS EACH PERSON IS TO PERFORM
- CONFUSION OVER TYPE OF LEADERSHIP
- CONFUSION ON WHERE LEADERSHIP WILL COME FROM

Team Dynamics
TEAM Development Stages

QUESTIONS ASKED BY GROUP MEMBERS IN THIS STAGE ARE:

"WHAT ARE WE HERE FOR?"

"WHAT PART WILL I PLAY IN THE TEAM?"

"WHAT AM I SUPPOSE TO DO?"

FEELINGS ENCOUNTERED AT THIS STAGE:

- CONFUSION ON ROLES, TASKS, AND AUTHORITY
- ANXIETY ABOUT ROLES AND TASKS
- FRUSTRATION BECAUSE OF UNFAMILIAR SETTING OR UNKNOWN LINE OF AUTHORITY
- ANGER

Team Dynamics
TEAM Development Stages

STAGE 2: DEFINING

THE GROUP STARTS TO DEFINE THE TASK TO BE PERFORMED, OR OBJECTIVE TO BE REACHED.

PEOPLE BEGIN TO SEE WHAT KINDS OF ROLES THEY WANT TO PLAY IN REACHING THE OBJECTIVE.

STILL SEE THEMSELVES AS INDIVIDUALS WORKING WITH OTHER INDIVIDUALS TO PERFORM A TASK.

Team Dynamics
TEAM Development Stages

COMMON INTERACTIONS IN THIS STAGE OF TEAM BUILDING:

- CONFLICTS ON WHETHER THE ISSUE OR PROBLEM HAS BEEN DEFINED CORRECTLY.
- CONFLICTS BETWEEN MEMBERS WHO WANT TO GET THE JOB DONE QUICKLY AND THOSE WHO WANT TO MOVE WITH MORE DELIBERATION.
- CONFLICTS AMONG THOSE WHO HAVE ALREADY DECIDED HOW THE JOB SHOULD BE DONE AND THOSE WHO WANT TO LOOK AT OTHER OPTIONS.
- CONFLICTS BETWEEN MEMBERS WHO WANT A STRONG, AUTOCRATIC DIRECTION AND OTHERS WHO PREFER TO WORK IN A PARTICIPATIVE MODE.

Team Dynamics
TEAM Development Stages

DEFINING STAGE CHARACTERIZED BY:

- PERSONAL AGENDAS
- SOME MEMBERS WANTING TO GAIN INFLUENCE IN THE GROUP BECAUSE THEY:
 - SEE THEMSELVES AS NATURAL LEADERS OR EXPERTS
 - FEEL THEY HAVE THE CORRECT PRIORITIES OR CORRECT METHODOLOGY
- SOME MEMBERS WANT TO USE THE GROUP TO INCREASE VISIBILITY OR POWER.
- HIGH TASK ORIENTED MEMBERS BECOMING IMPATIENT WITH GROUP DYNAMICS ORIENTED MEMBERS.

Team Dynamics
TEAM Development Stages

STAGE 3: IDENTIFYING

MEMBER SENSE THEY ARE NO LONGER A COLLECTION OF INDIVIDUALS, BUT A GROUP WORKING TOGETHER TOWARD A COMMON GOAL.

IDENTIFYING STAGE CHARACTERIZED BY:

- MEMBERS DEFINE THEIR ROLES AS SERVING THE GROUP AND NOT THEMSELVES.
- MEMBERS WHO ARE TASK ORIENTED NOW REALIZE THAT GROUP PROCESSES ARE IMPORTANT.
- MEMBERS WHO HAVE RETAINED INDIVIDUALITY OR JOINED SUBGROUPS TO ENJOY MORE INFLUENCE IDENTIFY WITH GROUP AS A TEAM.
- FRAGMENTATION FADES
- TRUST IS BUILT

Team Dynamics
TEAM Development Stages

STAGE 4: PROCESSING

MEMBERS WORK TOGETHER ON TASKS TOWARDS THE OBJECTIVE.

PROCESSING STAGE CHARACTERIZED BY:

- MEMBERS EVALUATE THEIR EFFECTIVENESS IN WORKING.
- EXPERIMENT WITH NEW ROLES THAT WILL HELP GROUP SUCCEED, AS LEADERSHIP CHANGES.
- FORMAL LEADERSHIP BECOMES LESS PRONOUNCED AS MEMBERS REALIZE THEY ALL MUST LEAD AT TIMES.
- GROUP TAKES ON A UNIQUE IDENTITY

Team Building Behavior

Being supportive and encouraging

Confront detrimental behavior as needed

Constructive when confined to people's inappropriate behavior

Disruptive when directed at personality, presumed attitudes or motives

Gatekeeping

Keep channels of communication open,

Help others to participate

Throttle dominating participants

Mediating between parties in dispute

Ask permission

Clarify the real differences and areas of agreements

Team Building Behavior

Harmonizing

Reduce tension

Works out disagreements

Admits error

Changes proposals to help group

Looks for middle ground

Summarizing

Gives the team time to breathe

Clears away confusion

Restores team confidence by showing progress has been made

Provides concrete points on which further work can be based

Team Building Behavior

Process Observing

Are there power and control issues among members?

Does the team avoid tackling major issues?

TEAM SUBVERTING BEHAVIOR

SHUTTING OFF

CUTTING OFF THE IDEAS OF ANOTHER TEAM MEMBER BY:

- INTERRUPTING DISCUSSIONS AND CHANGING TOPICS
"HEY, THAT REMINDS ME OF SOMETHING. DO YOU REMEMBER WHEN?....."
- REBUTTING A TEAM MEMBER'S IDEA BEFORE HE/SHE FINISHED

TEAM SUBVERTING BEHAVIOR

●USE OF DERISIVE HUMOR

"GOOD OLD PREDICTABLE JEFF. NO DISCUSSION IS COMPLETE UNTIL HE TALKS ABOUT THE BAD PERFORMANCE APPRAISAL EXPERIENCE HE HAD."

●IGNORING THE SPEAKER

TEAM SUBVERTING BEHAVIOR

ANALYZING OR LABELING

TEAM MEMBERS' PUT LABELS ON A PERSON'S BEHAVIOR, OR TRY TO DESCRIBE OTHER TEAM MEMBERS ATTITUDES OR MOTIVES IN A DISCUSSION.
"MARTHA, IF YOU WEREN'T BEING SO DEFENSIVE, WE COULD PROBABLY APPROACH THIS TOPIC MORE CONSTRUCTIVELY."

TEAM SUBVERTING BEHAVIOR

DOMINATING

DOMINATOR LIKES TO TAKE OVER THE DISCUSSION.

ATTEMPTS TO MANIPULATE AND CONTROL THE TEAM AT THE EXPENSE OF OTHERS.

DOMINATOR FOCUSED ON HIS/HER PERSONAL AGENDA NOT TEAM GOALS.

TEAM SUBVERTING BEHAVIOR

YES-BUTTING

THE YES-BUT RESPONSE SAYS ONE THING WHEN IT ACTUALLY MEANS ANOTHER.

"YES, I UNDERSTAND WHAT YOU'RE SAYING, BUT I THINK YOU'RE MISSING THE POINT."

TEAM SUBVERTING BEHAVIOR

NAYSAYING

TEAM MEMBER WHO DECLARES HIMSELF/HERSELF THE "DEVIL'S ADVOCATE". THEY BELIEVE THEIR FUNCTION IS TO MAKE SURE WHAT IS WRONG WITH ANOTHER'S IDEA GETS EXPRESSED.

THEY EMPHASIZE WHAT IS WRONG SO RELENTLESSLY THAT WHAT IS RIGHT GETS BURIED AND THE DISCUSSION BECOMES LOPSIDED.

APPENDIX E
SCORING KEY AND
ENTITY-RELATIONSHIP DIAGRAM

Scoring Key:

Four Digit Assigned Team and Student Code Number _____

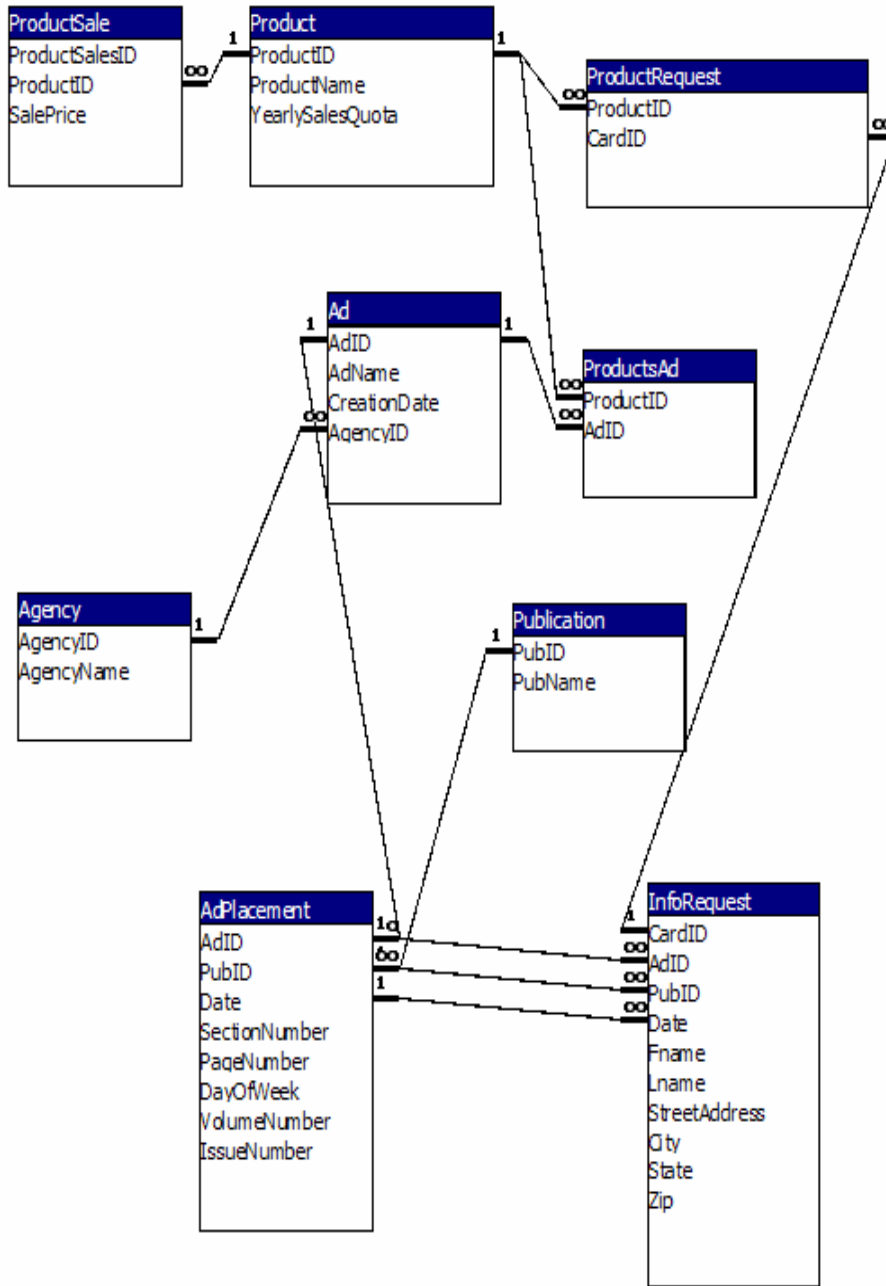
Item	Possible Points	Remarks
ERD created	10	Was ERD actually created/drawn and how well was it done or how readable/understandable is it?
All Entities/Tables identified/created.	10	Were all 9 entities/tables identified? Some will have more depending on how they conceptualized the database, especially with regard to the AdPlacement entity/table. (approximately 1 point per table)
Entities/tables well named based on case scenario.	10	Are the table names consistent with the case scenario and were singular names utilized?
All entities/tables contain some example attributes.	10	Are there sufficient attributes to indicate understanding of the database design necessary to meet the case scenario stipulations?
Attributes well named.	10	Are the attributes named in agreement with the case scenario?
Correct relationships established.	10	Are relationships based on PK and FK and consistent with case scenario?
Correct cardinality indicated.	10	Are cardinalities indicated on the ERD and are they correct?
Proper Primary Keys identified.	10	Are PK's indicated and are they reasonable based on the case scenario?

Database appears to be normalized.	10	Does the database appear to be in 3NF based on the case scenario and the stated assumptions?
Assumptions stated	10	Note students were instructed that all ERD's are based on "some assumptions" or interpretations that must be stated to more clearly understand the resulting database conceptualization. Therefore, some assumptions must be stated.
TOTAL	100	

Notes: Depending on the stated assumptions several conceptualizations of the database are possible. Therefore, grading of each student ERD is subjective and based upon the ERD Tasks description and the assumptions stated by each student.

Entity Relationship Diagram

Note: This is just one of many possible conceptualizations of the database. Student ERD's might well differ based on the stated assumptions. PK's are as follows: Product – ProductID; ProductRequest – ProductID and CardID; ProductAds – ProductID and AdID; ProductSales – ProductSalesID and ProductID; Agency – AgencyID; Ad – AdID; AdPlacement – AdID, PubID and Date; Publication – PubID; and InfoRequest – CardID, AdID, PubID and Date.



APPENDIX F
DEMOGRAPHIC SURVEY

Four Digit Assigned Team and Student Code Number

Please circle the responses below.

1. What is your Gender?

- a. Male
- b. Female

2. Is English the first language you spoke at home as a child?

- a. Yes
- b. No

If you answered yes to question 2, you are finished with this survey, otherwise please answer question 3.

3. Please select the first language you spoke at home as a child below:

- a. Arabic
- b. Chinese (Mandarin)
- c. Chinese (Cantonese)
- d. Dutch
- e. French
- f. German
- g. Hindi
- h. Indonesian
- i. Japanese
- j. Korean
- k. Philippine
- l. Russian
- m. Spanish (Latin America)
- n. Thai
- o. Vietnamese
- p. Other (please write in) _____

APPENDIX G
BRAINSTORMING TRAINING

The following is the presentation in outline from used to provide Brainstorming training to the control group.

Brainstorming is "a conference technique by which a group attempts to find a solution for a specific problem by amassing all the ideas spontaneously by its members" - Alex Osborn.

How to brainstorm in a medium-sized group

Four to fifteen people

A central person to

- coordinate the proceedings,
- introduce the purpose of the brainstorming session
- outline the rules and ensure rules are followed
- actively encourage the participants. This person is the facilitator (facilitate = to make easier).

Then have a brief warm-up on a totally unrelated and fun topic

Start the main topic when the right mood is established

- everyone in the group shouts out their ideas
- they are all written down
- analyzed later.

Methods of recording the ideas is

- on flipcharts (large pads of paper)
- a blackboard,
- overhead projector transparencies,
- a computer
- or individual pads of paper.
- to use dedicated writer

Follow the standard brainstorming rules:

- Postpone and withhold your judgment of ideas
- Encourage wild and exaggerated ideas
- Quantity counts at this stage, not quality
- Build on the ideas put forward by others
- Every person and every idea has equal worth

APPENDIX H
TEAM DATABASE PROJECT

Team Database Project

Your team has been invited by the Right Way University (RWU) to design and submit a prototype database for consideration as a final product to be implemented. You are being asked to consider the following. RWU desires that your proposed database be designed in Access, if your database is selected for further evaluation it will then be tested in another more robust DBMS, for example, MySQL, Oracle, Microsoft SQL Server, etc., in order to fully test the design. RWU desires that the trial database track information on students, classes, instructors, departments, degrees, majors, minors, and classroom locations. (Your team realizes that this will necessitate creating a table for each of the above, as well as one table with a combined or concatenated primary key to reflect the fact that a student is enrolled in a particular class. Each table should contain a minimum of 10 rows or records.) RWU wants you to first create an entity relationship diagram (ERD) indicative of the above database schema or structure. Additionally, RWU has asked that your team create forms to simplify data entry into all tables. RWU also wants to be able to query the test database to determine the following things;

- (1) Location of classes and the instructor teaching the class which should include the class ID, the class name, the building and room Number, the instructor's first name and last name, additionally the query should be sorted by the class names and this query should be named, ClassesLocationAndInstructor;
- (2) Classes a student is enrolled in which should include the student's last name, first name, the class name, and the grade received, if any, additionally the query should be sorted and grouped by the students last names and then by the class names and this query should be named, ClassesStudentsEnrolledIn;

- (3) The students advised by a professor which should include the professor's last name, and the students ID number, last name and first name and the query should be sorted by the professors' last names and this query should be named, InstructorAdvisees ;
- (4) The location of a student's classes which should include the student's last name, first name, class name, section number, days/times, building and room number and the query should be sorted by the students' last names and the class names and this query should be named, LocationOfAStudentsClasses;
- (5) Students in a class which should include the class name, the student ID, the building abbreviation, the room number, the last name of the student, and the first name of the student and the query should be group by class name and sorted by the class name and student last name and this query should be named, StudentsInAClass; and finally,
- (6) The students who have declared their degree, major and minor which should include the student ID, student last name, student first name, degree, major and minor and the query should be sorted by student ID and named, StudentsWhoHaveDegreeMajorAndMinor.

You have been also asked to prepare design six reports utilizing the above six queries named identically to the query data source, with the special requirement that the StudentsInAClass report include a count of the number of students enrolled in each course.

RWU has mandated that the database be normalized to the third normal form and that you provide them with a narrative listing future enhancement and scalability

considerations which will improve the database and ensure the use of it well into the future. Additional enhancements can be included in the demonstration database, for example, an opening Splash Screen, Switchboard form, etc., and would be much appreciated. RWU will pick the best submission(s) for top ranking (marks).

All of the above will be prepared by the team and submitted to the professor in an email as a zipped folder containing the ERD, the Database and the narrative.

APPENDIX I
SELF-EFFICACY SURVEY

Four Digit Assigned Team and Student Code Number

Please circle your responses below.

1. Do you believe you can make a score of 60% (60 points out of a 100) or better on the Entity Relationship Diagram Task?

Yes

No

2. On a scale of 1 to 10, where 10 is complete confidence and 0 is no confidence, how confident are you that you can make a score of 60% or better on the Entity Relationship Diagram Task?

10	9	8	7	6	5	4	3	2	1	0
Complete					Somewhat					No
Confidence					Confident					Confidence

APPENDIX J
DATA TABLE

Team Number	Learning Mode (LM)	Gender (GEN)	Diversity (D)	Self-efficacy (SE)	Team Cohesion (TC)	DMTP
3102	1	0	0.24489	6	39	53
3103	1	0	0.24489	9	39	8
3104	0	0	0.24489	3	17	68
3105	0	0	0.24489	4	33	12
3106	1	1	0.24489	7	42	8
3107	1	0	0.24489	6	31	8
3201	1	1	0.5	6	34	39
3202	1	1	0.5	6	36	63
3203	1	0	0.5	5	44	9
3204	1	0	0.5	*	33	12
3205	1	1	0.5	*	28	68
3206	1	0	0.5	2	37	15
3301	1	1	0.77551	10	38	98
3302	1	1	0.77551		25	38
3303	1	1	0.77551	3	30	64
3304	1	1	0.77551	7	21	51
3305	1	0	0.77551	5	38	59
3306	1	1	0.77551	10	37	57
3307	1	1	0.77551	6	25	68
4101	1	0	0.61111	8	34	34
4102	1	0	0.61111	5	45	45
4103	1	0	0.61111	7	44	44
4104	1	1	0.61111	5	36	36
4106	1	1	0.61111	7	31	31
4107	1	1	0.61111	5	40	40
4201	1	0	0.44444	8	26	26
4202	1	1	0.44444	5	31	31
4203	1	1	0.44444	6	42	42
4204	1	0	0.44444	3	33	33
4205	1	1	0.44444	5	36	36
4207	1	1	0.44444	7	40	40
4301	1	1	0.48979	2	36	36
4302	1	1	0.48979	7	41	41
4303	1	1	0.48979	6	44	44
4304	1	0	0.48979	2	30	30
4305	1	1	0.48979	6	41	77
4306	1	0	0.48979	8	36	36
4307	1	1	0.48979	8	36	36
1101	0	1	0.24489	7	39	65
1102	0	0	0.24489	6	40	49
1103	0	0	0.24489	7	32	57

1104	0	0	0.24489	7	37	66
1105	0	0	0.24489	3	21	67
1106	0	1	0.24489	8	34	63
1107	0	0	0.24489	6	45	57
1201	0	1	0.44897	6	30	28
1202	0	1	0.44897	9	35	21
1203	0	0	0.44897	7	40	81
1204	0	1	0.44897	6	38	61
1205	0	0	0.44897	8	35	78
1206	0	1	0.44897	6	40	21
1207	0	0	0.44897	6	37	32
1301	0	1	0.44444	7	39	68
1302	0	1	0.44444	10	37	76
1303	0	1	0.44444	6	37	78
1304	0	0	0.44444	6	38	85
1306	0	0	0.44444	8	41	88
1307	0	0	0.44444	6	26	71
2101	0	0	0.5	2	42	54
2102	0	1	0.5	7	37	75
2103	0	0	0.5	3	40	74
2105	0	0	0.5	7	20	38
2106	0	1	0.5	9	37	75
2107	0	1	0.5	2	37	42
2201	0	1	0.44444	5	37	48
2203	0	1	0.44444	8	41	75
2204	0	0	0.44444	5	33	46
2205	0	1	0.44444	6	36	53
2206	0	0	0.44444	3	36	63
2207	0	1	0.44444	6	37	54
2301	0	1	0.32	9	41	64
2302	0	1	0.32	6	35	64
2304	0	0	0.32	8	37	52
2305	0	0	0.32	8	38	78
2307	0	1	0.32	7	36	30

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