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THE IMPACT OF LOW ROPES COURSE TRAINING ON TEAM DEVELOPMENT

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BY
DANIEL J. MILLER, JR.

M.A., University of Northern Colorado, Greeley, 1992
B.S., United States Air Force Academy, Colorado Springs, 1986

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BY

Daniel J. Miller, Jr.

THE DISSERTATION IS APPROVED

Robert G. Stein, Ph.D., Chair

Mark M. Burroughs, Engr.D., P.E.

Frank Prochaska, Ph.D.

Earl R. Nason, Ph.D.

Date Approved

ABSTRACT

A low ropes course is one type of facility used in conducting experiential education. Experiential education is similar to and/or synonymous with experiential learning, action learning, outdoor training, and adventure based learning. For the purposes of this study, they will be used interchangeably. Experiential learning is a powerful and exciting methodology used in education, counseling, training, therapy, and team development by organizations ranging from elementary schools to Fortune 100 companies. Providers and participants alike feel good about what they experience in experiential education. Testimonial and anecdotal evidence claim that experiential training is valid and reliable (Priest, Attarian, and Schubert, 1993). However, this is not enough to sustain and improve on the methodology. Much greater insight is needed to determine the best approaches to use and how much and often it should be used.

The present study investigates how experiential team building conducted on a low ropes course affects team development. It was hypothesized that a 3 hour experiential training exercise would affect team development as measured by both the Horizontal Team Member Exchange II (HMX-2) and Team Development Inventory (TDI) instruments.

The subjects were 127 undergraduate students assigned to either a control or experimental group. The experimental group received a 3 hour experiential training curriculum designed to enhance their teamwork skills.

Results showed significantly positive increases in team development for the experimental group on both instruments. The control group results showed no significant change in team development on either instrument. These results and suggestions for future research on team development are discussed.

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CHAPTER I

INTRODUCTION

Experiential education employs a dynamic and exciting student centered learning environment. The learning process is refreshing and truly different from the lecture and classroom environments that most of us are used to. According to Coleman (1976), classroom and experiential education differ in important ways. In the classroom, students typically learn symbolically through words and text. At a later time, they may or may not experience what they learned. In experiential education, the learning steps are reversed. Students are required to act first and observe the consequences of their actions. This is followed by reflection, where they reflect on and potentially learn about what they experienced. This study provides the opportunity to explore the experiential learning process and how it can be used to develop teams.

Statement of the Problem

The military has been conducting experiential education, learning through experience, for hundreds of years. Field encampments, ruck marches, orienteering, rappelling, rope climbing, and field exercises are age old examples of this. In 1961, the Air Force Academy built and used its first experiential learning facility. The Group Reaction Course, as it was then called, was designed to accomplish three objectives during Basic Cadet Training (BCT). First, the course provided basic cadets an

introduction to the principles and techniques of group problem solving. Second, it provided basic cadets an understanding of the importance of discipline and teamwork in solving group problems. Third, the course was used to evaluate a basic cadets future leadership potential (Garvin, Nason, and Otto, 1996). By 1990, the course and objectives evolved to the present day Leadership Reaction Course described in Chapter 4. The popularity of experiential learning courses has grown and are currently used by schools, businesses, and other groups for a variety of purposes, including team building.

Getting people to work together more effectively has become a necessity with the increased emphasis on teams throughout organizations and the search for a competitive advantage. A specific example of increased team use involves the move toward a Quality Air Force (QAF) environment (the Air Force version of Total Quality Management). "QAF is a leadership commitment and operating style that inspires trust, teamwork, and continuous improvement everywhere in the Air Force" (Holmes, 1994, 1). Teams are a critical part of the QAF culture; improving existing processes, solving problems, or developing new plans or procedures. Four common types of teams are used: tiger teams, process action teams, developmental teams, and natural working groups. Tiger teams are normally formed to deal with a specific urgent problem. They typically have a short life-span and disband following completion of their task. Process action teams (PATs) are chartered to improve an existing process. The members usually have a vested interest in the process and come from diversified backgrounds. Developmental teams are created to design new processes and projects. Natural working groups work with a common desire to continually improve shared work processes (Holmes, 1994). The Air Force is not

alone in its increased reliance on teams. According to Hackman (1989), all American organizations appear to be using work teams with increasing frequency.

The Air Force and other organizations are increasing their use of teams and making team use critical to accomplishing their respective missions, however, the study of teams has not kept pace. There appears to be little empirical evidence evaluating team development programs.

Overview of the Study

In some organizations, teams come and go. People are brought together, tasked with a mission or objective, and sent on their way after completion. Examples of this style of team use can be seen in commercial and military aircrews, NASA's space shuttle operations, and missile alert crews. Other organizations use intact work teams that exist for long periods of time. Whether newly formed or intact, the importance of team member interaction and teamwork to realized performance needs serious consideration. This study considers both team member interaction and teamwork by concentrating on the effect conducting team building exercises on a low ropes course has on team development.

Purpose of the Study

The United States Air Force Academy (USAFA) is tasked with producing future leaders of our Air Force. To accomplish this, a four pillar approach of military, academic, athletic, and spiritual development is applied. The pillars overlap, producing

outstanding young officers who have the qualities and experiences essential for maintaining the greatest Air Force in the world.

Throughout a cadet's "Academy experience," they are associated with many groups and teams. Cadets are members and/or leaders of elements, flights, squadrons, and groups that make up the Cadet Wing. Cadets are also associated with the parachuting team, rifle team, pistol team, saber drill team, flying team, debate team, and intercollegiate athletic teams, just to name a few. Each has a mission with accompanying objectives.

A cadet's life has an abundance of group and team affiliations. Additionally, many of their affiliations change each semester. A specific example involves the Cadet Wing military structure. All of the cadet military staff positions are rotated each semester, allowing leadership and followership opportunities to more cadets. In changing positions each semester, a cadet's roles, responsibilities, peer groups, superiors, subordinates, and rank changes, requiring new teams to develop and get the job done with little interruption in work flow.

Through all of this, it is imperative that cadets receive the best team training available. This training makes the semester transitions smoother as well as prepares them for the operational Air Force. The number of team and group affiliations they will experience in the operational Air Force will not likely decrease and the missions importance will increase. Rather than being in a predominantly academic environment as they are at the Academy, cadets will find themselves immersed in the operational Air

Force's mission of defending the interests of the United States. Their roles will range from flying a desk to flying aircraft.

Training at the Academy is conducted through a four year curriculum where cadets are taught followership and leadership attributes and applications. Although USAFA uses various methods to produce leaders, this study focuses specifically on the use of the Leadership Reaction Course (LRC). The LRC is a low ropes course and is currently used in two important programs, Basic Cadet Training and the Department of Behavioral Sciences and Leadership Behavior Science 310 (BS310) academic course. To date, only anecdotal evidence of the LRC's effectiveness has been collected. This study establishes a needed foundation of empirical evidence that validates the current LRC training in BS310 and provides insight for future training.

Significance

This effort provides a foundation of research on the effectiveness of low ropes course training for team development at USAFA. Also, all aspects of this effort are presented so that others can build and improve on the design of the study, the intervention, and the instruments. Additionally, it bridges the gap between practitioners and researchers in the experiential learning realm. This is further discussed in Chapters 2 and 5.

The results of this research will have a lasting impact at USAFA. It provides the first empirical data collected on and validates a current use of the Leadership Reaction Course. This effort will be continued not only on the low ropes course, but also on the

high ropes courses. After several follow-on studies are accomplished, the Academy faculty will be able to determine what types of courses to use and how to use them to get the desired affect from the training. Once the initial research foundation is established, follow-on studies may determine the impact of other action-oriented programs such as the parachuting program, combat survival program, and gliding program.

General Hypotheses

In accomplishing this research, an attempt is made to determine the affect low ropes course training has on team development. The general hypothesis is stated as follows (specific hypotheses are listed in Chapter 5):

> Experiential education conducted on a low ropes course positively affects team development.

Definition of Terms

Experiential education - a process through which a learner constructs knowledge, skill, and value from direct experiences.

Synergy - combined action or operation enhanced by people working together-coined by Buckminster Fuller (Snyder, 1980).

Team - a distinguishable set of two or more people who interact, dynamically, interdependently, and adaptively toward a common goal/objective/mission, who have been assigned specific roles or functions to perform, and who have a limited

life-span of membership (Swezey and Salas, 1992).

Team or group development - patterns of change that occur in groups throughout their life cycle, from formation to dissolution (Forsyth, 1990) (the terms group development and team development are used interchangeably for purposes of this study).

T-groups - (training groups) groups that meet so members can examine how groups function and how participants behave in them (Lacoursiere, 1980).

Dissertation Road Map

This section is a road map to the dissertation, providing an overview of Chapters 2 through 7 with their respective highlights.

Chapter 2 contains the literature review from the "mile wide, inch deep" perspective. The first section provides a synopsis of team development theories and models ranging from the Hawthorne Studies in the late 1920's and 30's to the most current team models such as the Developmental Continuum Model by Kozlowski (1997) and his colleagues. The second section discusses team building and how it is used to enhance team development, including a brief summary of research efforts in this area. The third and final section of Chapter 2 covers experiential education, including the history behind the methodology, models and principles followed in conducting experiential education, and current empirical research efforts.

Chapter 3 contains an analysis of the literature from Chapter 2. Following the "inch wide, mile deep" perspective, the analysis breaks the team development problem

into it's component pieces, discussing a common theme seen throughout the various team development models. This directs our focus to interpersonal relationships. Since team building helps develop relationships, the question is then, what type of team building intervention and what methodology should be used to enhance team development? These questions are answered here.

Chapter 4, Synthesis, brings together the team building approaches and methodologies from Chapter 2 with the team development analysis from Chapter 3. Synthesizing the literature and analysis results in conducting experiential team building activities on a low ropes course using the problem-solving intervention method. This approach provides the foundation for how training will be conducted on the Leadership Reaction Course (LRC). The LRC and the team training curriculum is fully described. To determine if the training is "working," instrumentation is needed. Following the curriculum description, the Horizontal Team Member Exchange II (HMX-2) and Team Development Inventory (TDI) instruments are discussed.

Chapter 5, Validation, demonstrates the success of our current team training through a quasi-experimental design to test the approach recommended in Chapter 4. The experimental design includes areas such as the population and sample size, instrumentation, the independent and dependent variables, specific hypotheses, and test statistics. Also discussed is how this effort attempted to overcome the eight barriers to experiential education research identified by Priest et al. (1993).

Chapter 6, Results, provides the analysis of data. Common descriptive statistics are presented as well as a nonparametric statistical analysis. Nonparametrics were used

because both the Horizontal Team Member Exchange-II and Team Development Inventory instruments provided an ordinal data set. A discussion of the findings follows each test.

Chapter 7 rounds out the dissertation, providing conclusions and recommendations based on the findings of this effort. Also, areas for future research are discussed.

CHAPTER II

SEARCH OF THE LITERATURE

The literature on group and team development is abundant. Many researchers have advanced the depth of understanding through theories and models of development. However, fewer researchers have conducted empirical studies to determine how to enhance progress through the stages or cycles of development as referenced in the respective theories and models. A common way to enhance developmental progress is through team building. This chapter provides a broad overview of the work done in team development, followed by a review of team building and experiential learning literature and research.

The Development of Teams

. Forsyth (1990) defined team development as patterns of growth and change that occur in groups throughout their life-cycle, from formation to dissolution. Tremendous volumes of research have been generated on the study of group and team development.

The first major effort in the study of group development happened almost by accident. The classic Western Electric-Hawthorne study, commonly known as the *Hawthorne Studies*, conducted from 1927 through the early 1930's measured the effects of physical, biological, and social factors on individual productivity. The researchers

were concerned with worker fatigue, equipment being used and/or changed, and the workers' attitude towards their work and the company. Table 2.1 shows the original research questions of the study. The researchers manipulations did have an impact on productivity, however, they discovered that productivity continued to rise even when not expected. Turner and his colleagues, without intention, demonstrated that giving subjects special attention had a positive influence on productivity (Hare, 1976). These studies provided the foundation for interest in group research.

Table 2.1. Hawthorne Study Research Questions

1. Do employees actually get tired out?
2. Are rest periods desirable?
3. Is a shorter working day desirable?
4. What is the attitude of employees toward their work and toward the company?
5. What is the effect of changing the type of working equipment?
6. Why does production fall off in the afternoon?

(Source: Hare, 1976, 313)

Since then, many studies have been conducted and models of development theorized. These models generally fall into one of two categories, successive-stage theory and cyclical models. Successive-stage theory is described as any theory of group development that specifies the usual order of the phases through which the developing group typically progresses (Forsyth, 1990). An example is Tuckman's model (Tuckman,

1965; Tuckman and Jensen, 1977) of *forming*, *norming*, *storming*, *performing*, and *adjourning*. In contrast, cyclical models are a class of theories describing group development that assumes groups pass through various phases over time but that these phases reoccur repeatedly across the life-span of a group (Forsyth, 1990) as in Bales' equilibrium model. This section presents a chronological synopsis of selected team development models and their respective emphasis.

The Foundation of Group Development

The foundation of current team development models was established from research conducted on therapy groups, training groups (T-groups), laboratory groups, and natural groups. This first section provides an overview of the prominent models and theories developed from the 1950's through the 1970's that comprise the foundation.

One of the first studies that gained attention in the study of group development was conducted by Bales (1950). He first described his system of 12 categories in detail in his book *Interaction Process Analysis: A Method for the Study of Small Groups* in 1950. These categories of laboratory group observations, along with his previous work, suggested that a group goes through phase movements over time. This notion led to the first evidence of a group experiencing trends in their meetings. In 1951, Bales and Strodtbeck looked for phases that a group goes through in making decisions. Based on Bales' book, they hypothesized that groups tend to move from problems of *orientation*, to problems of *evaluation*, and then to problems of *control* or *solutions* (Bales and Strodtbeck, 1951). They were able to show that when problem-solving discussion

meetings were divided into three time periods, the predominant type of activity shifts from one phase to another in a manner reflecting the stages in a group's progress toward a decision (Hare, 1976). In their attempts to solve problems, they need to balance out their attention to both task needs and group/individual needs. Although certain issues tend to dominate group interaction during the phases of development, these issues can recur later in the groups life-cycle causing the group to oscillate between phases (Forsyth, 1990).

While Bales was developing his model, Bion was conducting group therapy with neurotic patients and writing a set of articles describing the ways in which the members of his groups reacted to his leadership and to each other (Bion, 1961). Thelen and his colleagues developed Bion's concepts into a systematic set of observational categories similar to Bales' work. In short, group operations were described in terms of three emotional states. These are *dependency*, *pairing*, and *fight-flight*. *Dependency* occurs when group members seem to be dependent on the leader or some external standard for direction. *Pairing* occurs when group members turn to each other in pairs for more intimate emotional response. *Fight-flight* occurs when group members act as if their purpose is to confront some threat by fighting or avoid some threat by running away from it. Additionally, the group is continuously "at work" on some problem and experiencing one of these states. Bion was mostly interested in studying the swing back and forth between emotional states and not on developing a specific theory of group development. Dunphy realized that Bion's scheme contained a sequential analysis of group development. He interpreted Bion's work and developed a group development model with the first stage being *dependency* (on the leader). The next stage was *fight* (attack on

the leader) followed by *flight* (from the leader). The next stage was *pairing* and finally developing into a *work group*, the final stage (Bion, 1961; Hare, 1976).

In 1956, Bennis and Sheppard presented the first detailed theory of group development related to training groups (Bennis and Sheppard, 1956). Their work was based on their experience with T-groups in workshops, educational settings, and the past theoretical insights of Freud, Schutz, and Bion (Hare, 1976). They summarized a training group develops through two phases with each phase having three subphases. In phase one, members are concerned with dependence and power relations. The subphases include *dependence*, *counterdependence*, and *resolution* and activity generally centers on broad role distinctions. In phase two, members deal with *interdependence* and their personal relations with other group members and involves a deeper concern with personality modalities. The subphases include enchantment, disenchantment, and consensual validation (Lacoursiere, 1980).

In 1958, Schutz presented a number of postulates concerning interpersonal behavior. His first postulate, the *postulate of interpersonal needs*, states every individual needs inclusion, control, and affection. He suggested that everyone needs to be included in groups and needed to include others in groups, wanted to control others and/or be controlled, and had a need to like other people and desired to be liked in return. From this he theorized a sequence of group development that was strongly influenced by Bennis and Sheppard's theory. He stated this as postulate four, the *postulate of group development* (Schutz, 1966). Briefly, he said the formation and development of a group always follows the same sequence. When integrating, the group goes through *inclusion*

(gaining a sense of identity), *control* (gaining control or getting controlled), and *affection* (making ties). Prior to termination, the steps are reversed to *affection* (breaking ties), *control* (releasing control over or by others), and *inclusion* (giving up group identity). The *control* and *affection* stages are similar to Bennis and Sheppard's *dependence* and *interdependence* phases and also related to Bion's *dependent* and *pairing* stages. However, his theory is different in that he mentioned a definite set of recurring cycles and the reversal of stages towards termination (Hare, 1976).

Tuckman's 1965 review of over 50 articles dealing with the stages of group development over time revealed that groups generally went through four distinct stages of development, *forming*, *storming*, *norming*, and *performing*. This model was aimed at serving conceptual, integrative, and organizational functions (Tuckman, 1965). He arrived at the four-stage model through inductive reasoning, noting each stage had both task and social-emotional components (Lacoursiere, 1980). Task components include descriptions concerning the nature of the work being done by the group. Socio-emotional components, or group structure, includes descriptions concerning patterns of interpersonal relationships (Hare, 1976). Although these two components were originally described as they apply to therapy groups, they can be summarized and applied to any group. Tuckman and Jensen (1977) later added *adjourning* as a fifth stage to Tuckman's model. According to Hare (1976), Tuckman's summary of the literature could be taken as a representation of the state of theory about group development up to 1965. Tuckman's model deserves a more in-depth look than the previous models reviewed because it is perhaps the most recognized team development model to date.

Stage 1 is *forming*. According to Tuckman (1965), the *forming* stage is comprised of orientation, testing, and dependence. The major processes of this stage are exchange of information, increased interdependence, task exploration, and identification of commonalties. It is characterized by tentative interactions, concern over ambiguity, polite discourse, and self-discourse (Forsyth, 1990). This first stage is divided into two aspects, testing and dependence and orientation and testing, for group structure and task activity, respectively (Hare, 1976; Bass, 1990). Testing and dependence involves attempts to discover what behaviors are acceptable to the group. Orientation and testing occurs when group members make indirect attempts to discover the nature and boundaries of the task (Hare, 1976). Griggs and Louw (1995) claimed that teams that do not lay the groundwork for trust in this stage will be derailed in later stages.

Stage 2 is *storming*. According to Tuckman (1965), the second stage is characterized by conflict and polarization around interpersonal issues. These behaviors serve as resistance to group influence and task requirements. Forsyth (1990) describes the main processes of stage two as disagreement over procedures, expression of dissatisfaction, emotional responses, and resistance. These are characterized by criticism of ideas, poor attendance, hostility, polarization, open conflict, and coalition formation. It is divided into two aspects, intragroup conflict under group structure and emotional response to task demands under task activity. Intragroup conflict occurs as group members become hostile towards one another as a means of expressing their individuality and resisting the formation of group structure. The emotional response is the result of not wanting to "expose" themselves to the group (Hare, 1976; Bass, 1990). Griggs and Louw

(1995) suggested that as conflict surfaces, "sore nerves" must be identified and dealt with early. To do this, you must go beneath the surface and uncover the real issues creating conflict. The first two stages of Tuckman's model are the same as Bales and Strodtbeck's areas of politeness and conflict (Bass, 1990).

In stage 3, *norming,* the major processes include the growth of cohesiveness and unity and the establishment of roles, standards, and relationships. Resistance is overcome in this stage and in-group feeling and cohesiveness develop, new standards evolve, and new roles are adopted. In the task realm, intimate and personal opinions are expressed (Tuckman, 1965). The group must develop a high degree of cohesion and cooperation while preserving their individual perspectives (Bass, 1990; Griggs and Louw, 1995) to succeed in the next stage.

The *performing stage*, stage 4, is when the group can bring it all together and make things happen. Interpersonal structure becomes the tool of task activities. Roles become flexible and functional. The group channels their energy toward accomplishing the task (Tuckman, 1965). This stage is also divided into two aspects. They are functional role-relatedness and emergence of insight, for group structure and task activity, respectively. Functional role-relatedness is possible because the group has developed as a social entity to the point where it can support rather than hinder the task processes through the use of function-oriented roles. Also, group members have gained insight into their own problems and behaviors (Hare, 1976). At this stage, individual performance improves and team members work synergistically. Although conflicts may still arise, team members can resolve them quickly and continue performing. Once a group reaches

this level of development, energy is high and members are pleased with themselves and one another. Group members have a task focus at this stage (Griggs and Louw, 1995).

The final stage, *adjourning*, was later added by Tuckman and Jensen (1977). This is the stage when the group disbands. The major processes involved are termination of roles, completion of tasks, and reduction of dependency. It is characterized by disintegration and withdrawal, increased independence and emotionality, and regret (Forsyth, 1990). Whether dissolution is planned or spontaneous, it can create problems for group members as they try to reduce their dependence on the group (Forsyth, 1990).

Hill and Gruner (1973) studied therapy groups of seriously delinquent boys. From their data, they presented a group development model in line with the work of Bales and Strodtbeck (Lacoursiere, 1980). Their model states that a group cycles through three stages; *orientation*, *exploration*, and *production* (Hill and Gruner, 1973). Their *orientation* stage is comparable to Tuckman's *forming* and *storming* stages and Bales and Strodtbeck's *orientation* stage. The *exploration* stage is comparable to Tuckman's *norming* and Bales and Strodtbeck's *evaluation* stages. Finally, the *production* stage is comparable to Tuckman's *performing* and Bales and Strodtbeck's *control/solutions* stages.

This review, although brief, provides a foundation of knowledge in group development. A tremendous amount of research has been conducted in this field. Through these efforts, researchers have studied core human interaction and described how people act and work together in small groups. Realizing that the majority of the models were based on therapy groups, their relevance and application to work groups and

teams may be limited. However, these prominent group development efforts were necessary in that they established the tools and methods for studying small groups. Small group research began with the Hawthorne Studies, where researchers were investigating worker productivity. Their results encouraged many others to conduct small group research. This led to the many theories and models presented thus far. The depth of the research is incredible and has provided the background and stepping stones needed for continued research. Present and future research will continue to benefit from these works. It is interesting to note that 50 years after the Hawthorne Studies, small group research seems to be going back to its roots, concentrating on worker productivity and team effectiveness.

Group Socialization and Working Relationships

More recent team development models are based on the group development works from the previous section as well as models of group socialization and working relationships. Two models in particular, by Moreland and Levine (group socialization) and Gabarro (working relationships) strongly influenced the more recent team development models and their mention is warranted.

In 1992, Moreland and Levine presented a group socialization model. Although this model does not fall directly under group development models, it gives insight into the typical course that an individual follows from the time he/she joins the group, to working in it, through leaving it. Since individuals make up groups, consideration of how an individual changes within the group must be considered.

Moreland and Levine (1992) summarized that group socialization follows a cumulative, predictable sequence just as group development does. The major difference is that group development operates at the group level while group socialization is an individual level process. The two processes occur simultaneously. Over time, the relationship between individuals in the group and the group itself changes. As the group develops, individuals change as they pass through the group in three reciprocal processes; evaluation, commitment, and role transition (Moreland and Levine, 1992). The evaluation process occurs when individuals appraise other group members and visa-versa. It is influenced by the exchange of rewards and costs of belonging to the group and one's general assumptions about the value of groups. The commitment process focuses on the individual's adherence to the group and the group's adherence to its members. Role transition occurs as the relationships between the individual and the group changes.

These three processes occur through a predictable sequence of *investigation*, *socialization*, *maintenance*, *resocialization*, and *remembrance*. Through each stage, group members experience the three reciprocal processes. The first stage, *investigation*, is marked by the cautious search for information between a potential new member and the group. The second stage, *socialization*, refers to group acceptance with the individual becoming a full fledged group member. *Maintenance*, stage 3, concerns the negotiation of roles. Stage 4, *resocialization*, occurs when the individual and the group do not see eye to eye. The differences will either be worked out or the individual will leave. The final stage is *remembrance*. This occurs when an individual departs the group. Based on the reasons for departure, it can be pleasant or hostile (Moreland and Levine, 1992).

Another model that also is not directly related to teams must be considered. Gabarro developed a model of working relationships that emphasizes task achievement rather than social and affective issues as Tuckman and others did. Although Gabarro's research focused at the dyadic level, his research applies to group relationships. His four stage model includes *orientation*, *exploration*, *testing*, and *stabilization* (Gabarro, 1990). The *orientation* stage is concerned with questioning other's motives, exchanging initial expectations on objectives, roles, and needs, and developing an initial understanding of how they will work together. The *exploration* stage moves beyond first impression. Its major tasks include exploring more detailed expectations, surfacing and clarifying differences in expectations, exploring and identifying questions and sources concerning trust and influence. The *testing* stage tests the mutuality of expectations and the basis and limits of trust and influence, resolving any differences. This leads towards defining a stabilized set of expectations. Once this is complete, the final stage, *stabilization*, is reached. The major tasks here are repairing any damage from events that led to negative feelings and insuring that the relationship continues to be productive, adaptive, and satisfying (Gabarro, 1990).

These researchers have looked into group development from a different perspective versus Bales, Bion, Schultz, and Tuckman. They delved deeper into how establishing relationships amongst group members plays an important role in group development, emphasizing relationships as the building block of groups.

Recent Models and Theories of Team Development

This section provides an overview of prominent team development models proposed in the 1980's and 1990's. The influence of the models and theories mentioned in the previous sections is evident. Some researchers built on them while others contested them. There has been a change in direction from the previous works. Current models are based more on naturalistic or intact work groups versus the past models study of therapy groups, T-groups, and laboratory groups.

The first model reviewed was presented by Kormanski and Mozenter (1987). Their model is sequential, developmental, and thematic and follows the theories presented by Tuckman, Bennis and Shepard, Schutz, Bion, Gibb, Yalom, and others. The stages they identified are *awareness*, *conflict*, *cooperation*, *productivity*, and *separation*. The model mostly builds on the work of Tuckman but goes further in developing both task and relationship outcomes for each stage (Kormanski and Mozenter, 1987).

Awareness is the overall theme for stage one, similar to Tuckman's *forming* stage. During this stage, the task outcome is commitment. This is accomplished through team members becoming oriented to the group, understanding and becoming committed to the group goals. The relationship outcome is acceptance, accomplished when team members become friendly, concerned, and interested in one another. These outcomes must be realized before entering the next stage, *conflict*.

The *conflict* stage is comparable to Tuckman's *storming* stage. The task and relationship outcomes are clarification and belonging, respectively. Clarification occurs when team members acknowledge and confront conflict openly. When the team can

listen to other members with understanding, a sense of belonging occurs. During this stage, the team learns effective conflict-management practices.

The *cooperation* stage, *norming*, has the task outcome of involvement and the relationship outcome of support. Involvement is characterized by including others in decision-making with the objective of promoting open communication. Support is characterized by recognizing and respecting individual differences, increasing cohesion. Collaboration becomes the norm and the team learns to both give and receive feedback.

The fourth stage is *productivity* (*performing*). The desired outcomes are achievement and pride, for task and relationship outcomes, respectively. This is accomplished through solving problems and promoting interdependence. Once team members encourage one another to contribute ideas and solutions and value others' inputs, this stages outcomes can be realized.

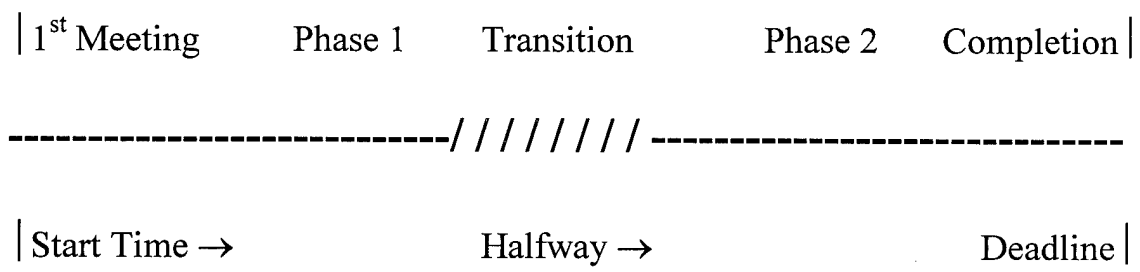
The final stage, *separation* (*adjourning*), is characterized by recognizing and rewarding team efforts for task objectives and encouraging and appreciating comments on team performance for relationship objectives. The desired outcomes are recognition and satisfaction.

The first real break from stage and phase models was offered by Gersick (1988). She determined that work groups do not progress smoothly through stages of development as suggested by her predecessors. Instead, teams progress through alternating inertia and revolution in the behaviors and themes in approaching their work, in a pattern of punctuated equilibrium. The "Punctuated Equilibrium" or "Time and Transition" model assumes that development depends on external relations, causing

groups to exhibit stable periods interspersed with brief, revolutionary changes (Sundstrom, DeMeuse, and Futrell, 1990). Her observations of group development suggest groups undergo a dramatic change in how they think about their work, their approach to it, and the energy they put into it. This typically happens at about the midpoint of the group's life-cycle. It is not until after the midpoint transition that groups make tangible progress towards their goal (Guzzo and Shea, 1991).

Gersick (1988) identified five phases in a group's life-cycle in problem-solving groups; the *first meeting*, *phase 1*, the *midpoint transition*, *phase 2*, and *completion* (see Figure 2.1). The *first meeting* is when the group comes to terms with the task the team will perform, identifying problems and opportunities that will likely be encountered. It is also a time when group boundaries and norms begin to develop. *Phase 1* goes from the *first meeting* to the midpoint of the groups life-cycle, whether the life-cycle is a few days or a few months. This phase is characterized by trial-and-error learning and internal exploring and may appear to be accomplishing very little. The *midpoint transition* is when the group goes through a major upheaval and reforms the group (Bass, 1990). The transition provides opportunities to assess the groups dynamics and prepare for the second half of its life-cycle. *Phase 2* is the major production period, the group is heavily involved in production work, culminating in a flurry of wrap-up activities before the deadline for *completion* (Hackman and Walton, 1986).

Figure 2.1. Time and Transition Model (adapted from Gersick, 1988)



(Source: Gersick, 1988, 22)

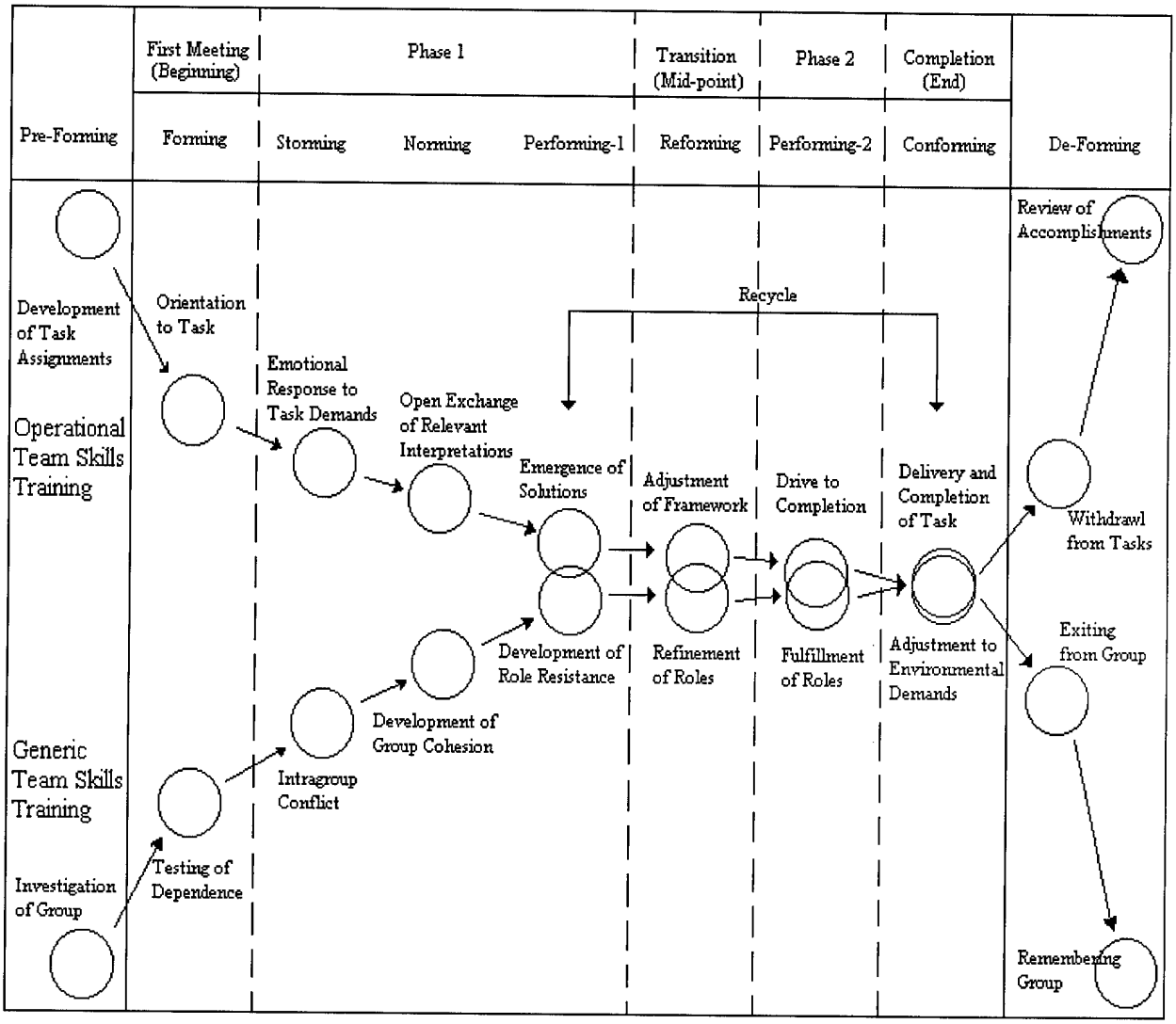
The Team Evolution and Maturation (TEAM) model developed by Glickman et al. (1987) combined the constructs developed by Tuckman and the findings of Gersick. The combination of these two concepts, based on the analysis of data from Navy teams undergoing simulation training, created a team performance model that predicts the stages a team goes through from beginning to end (see Figure 2.2).

The model suggests that task-oriented teams evolve through a series of developmental phases. These stages and phases are similar to those in previously discussed theories. The model indicates that teams can begin at different stages of development and spend different amounts of time in the various stages, realizing that not all teams progress through all stages.

The model also shows that teams must successfully complete two tracks; operational team skills training and generic team skills training. Operational team skills training represents the task-oriented skills required for task performance. The team works on understanding task requirements, discovering operational procedures, and acquiring

task information and task-oriented issues. Generic team skills training is concerned with behavioral interactions and attitudinal responses that must be developed between teammates. The two tracks converge before or at the point of task performance and diverge upon task completion.

Figure 2.2. The Team Evolution and Maturation Model (adapted from Glickman et al., 1987)



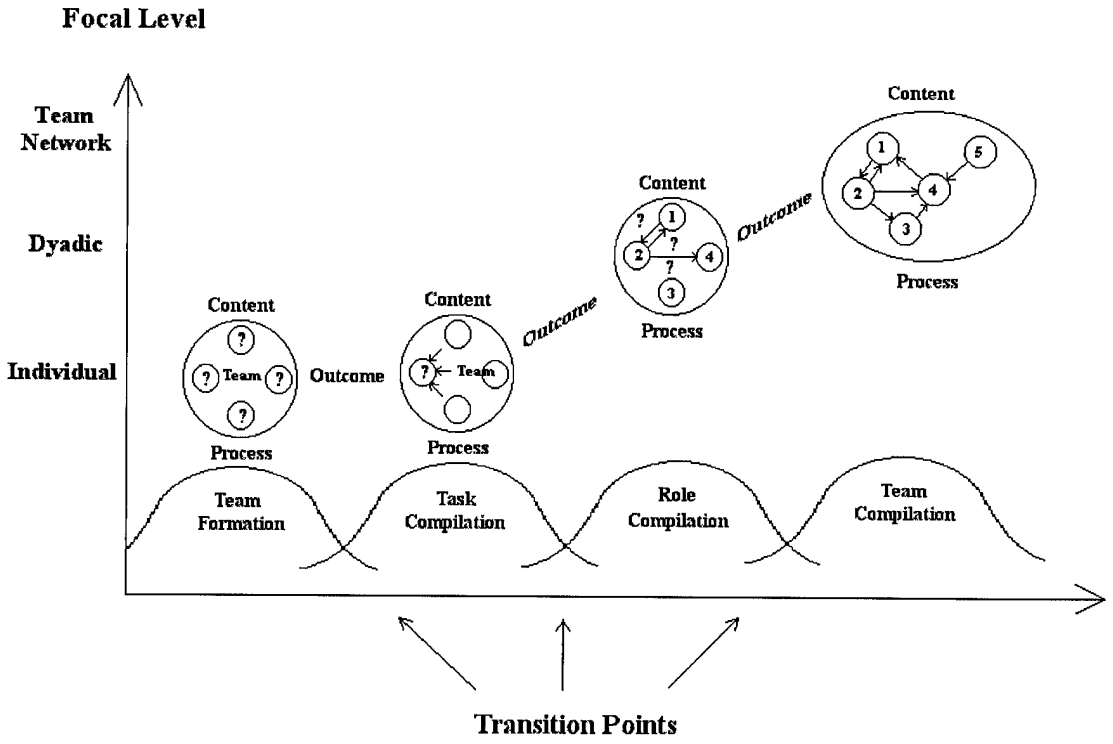
(Source: Glickman, Zimmer, Montero, Gurrette, Campbell, Morgan, and Salas, 1987, 21)

The developmental continuum, presented by Kozlowski (1997) and his colleagues, synthesized literature from team development, socialization, learning, team training, and leader-member exchange. The model proposes that teams progress through four stages; *team formation*, *task compilation*, *role compilation*, and *team compilation* (see Figure 2.3). This theory shows overlaps in stages, ties in interpersonal processes, and incorporates previous group development findings. This model is primarily concerned with the shift in levels (i.e. from individual to dyadic to team).

During phase 1, *team formation*, members seek information about one another and the teams purpose. The outcomes of this stage satisfy the needs for orientation and interpersonal knowledge. In phase 2, *task compilation*, team members are concerned with performing their individual tasks in the new team context. The feedback received concerning task performance strongly affects the development of self-efficacy. Once a foundation of task competence and self-efficacy are established, phase 3 begins. *Role compilation* is characterized by team members forming dyadic relationships with one another. This stage establishes role sets and role expectations. The final stage, *team compilation*, is when team members shift their focus to the team as a whole. This shift begins the development of team efficacy. This stage is characterized by team awareness and adaptability.

Kozlowski et al. (1997) emphasized that members move from a loose collection of individuals to a highly integrated team. Also, the stages overlap with no clear distinction between stage transition because team development is an incremental process without abrupt shifts from stage to stage.

Figure 2.3. Developmental Continuum (adapted from Kozlowski et al., 1997)



(Source: Kozlowski, Gully, Nason, and Smith, 1997)

The final team model reviewed was presented by Hackman (1987). Hackman's normative model attempts to bridge the gap between understanding team development and doing something about it. Figure 2.4 provides an overview of the model. The six major areas of the model are organizational context, group design, group synergy, process criteria, material resources, and group effectiveness. The first three areas mentioned are the three major points of leverage for fostering group effectiveness.

Group design consists of task structure, group composition, and group norms. The design should prompt and facilitate competent work on the task, creating conditions

favorable for task-effective behaviors to emerge and persist. Organizational context consists of the reward, education, and information systems. These should support and reinforce the group design. Group synergy can be positive or negative. Positive synergy occurs when synergistic gains from group interaction exceed group process losses. This is favorable and allows the group to take advantage of and exploit opportunities. Negative synergy occurs when process losses exceed interaction gains. The negative synergy can make a bad situation worse.

The process criteria include the level of effort, amount of skill and knowledge, and strategy brought to and applied to the task. The appropriate criteria may be available or in place, but without the next area, material resources, the group cannot be effective. If the group does not have access to needed tools, equipment, and money, no level of effort, skill, knowledge, or applied strategy will make them successful.

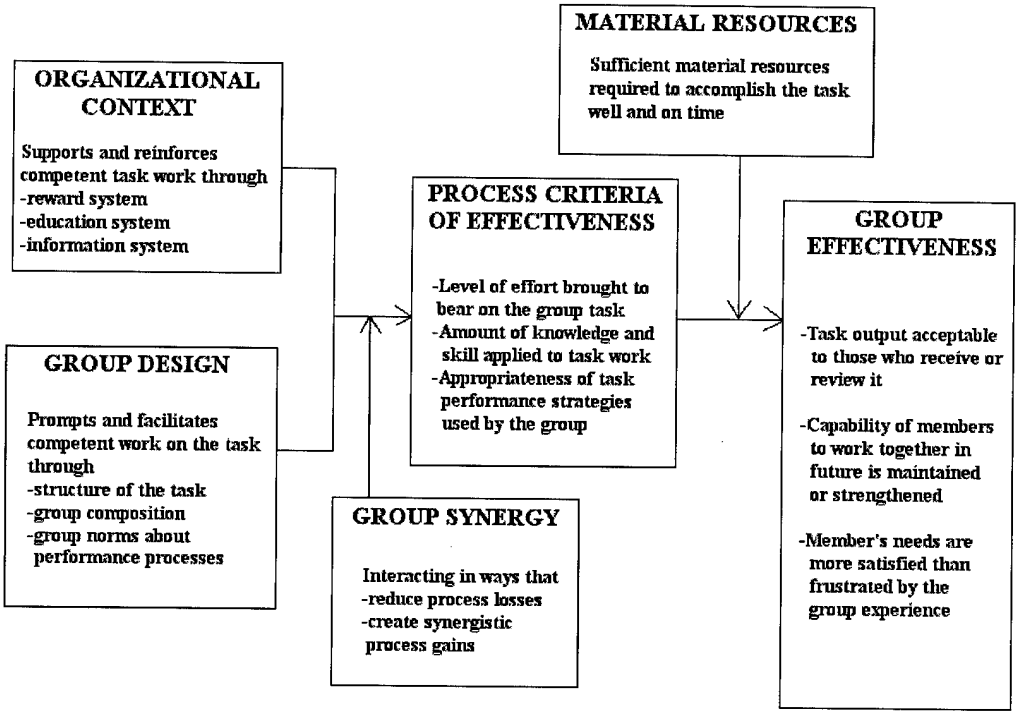
The last area is group effectiveness. Hackman's model emphasizes three key measurements of effectiveness. First, the groups' task output is acceptable to the customer. Second, the capability of the team members to work together in the future is either maintained or strengthened by their experience in accomplishing the present task. Third, each team member's needs are more satisfied than frustrated by the group experience.

Summary

The purpose of reviewing many developmental models is to lay the foundation for understanding the theoretical concepts and gaining appreciation for the great amount of work that has been done in the team development arena. Table 2.2 provides a synopsis of

many of the models reviewed as well as other notable works. A clear understanding of team development is a prerequisite to studying methods to enhance it.

Figure 2.4. Hackman's Normative Model of Group Effectiveness



(Source: Hackman, 1987, 331)

Table 2.2. Developmental Models (adapted from Kozlowski et al., 1997)

	Stages/Cycles				
Source	**Early Formation** ⇒⇒⇒		**Development** ⇒⇒⇒		**Disbandment**
Bales & Strodtbeck	Orientation		Evaluation	Control	
Bennis & Sheppard	Dependence	Counter Dependence	Resolution	Interdependence	
Bion	Dependency	Fight/Flight	Pairing	Work	
Caple	Orientation	Conflict	Integration	Achievement	Order
Francis & Young	Testing	Infighting	Getting Organized	Mature Closeness	
Gersick	1st Meeting	Phase 1	Transition	Phase 2	Completion
Gibb	Acceptance	Data Flow	Goals & Norms	Control	
Hill & Gruner	Orientation		Exploration	Production	
Kormanski & Mozenter	Awareness	Conflict	Cooperation	Productivity	Separation
Kozlowski	Team Formation	Task Compilation	Role Compilation	Team Compilation	
Modlin & Farris	Structuralism	Unrest	Change	Integration	
Schutz	Inclusion	Control	Openness/Affection	Control	Inclusion
Tuckman	Forming	Storming	Norming	Performing	
Tuckman & Jensen	Forming	Storming	Norming	Performing	Adjourning
Yalom	Orientation	Conflict		Intimacy	Termination
Gabarro	Orientation	Exploration	Testing	Stabilization	
Moreland & Levine	Investigation	Socialization	Maintenance	Resocialization	Remembrance

(Source: Kozlowski, Gully, Nason, and Smith, 1997)

Team Building

Team building may provide the answer for enhancing the development of teams. Forsyth (1990) defined team building as a team development methodology that fosters cohesion, clarifies structure, and reduces conflict. Christen (1987) stated that team building is a set of activities which accelerate the normal socialization process, providing an individual the opportunity to align with their organization and develop relationships within it. Christen also said that the more overlap between an individual's values, goals, style, perceptions, semantics, and personal agenda and that of the organization, the more closely aligned will be the strategic, tactical, and operational activities. He refered to team building as a "deliberate effort to create and maintain a group of people who can work well together toward the accomplishment of common goals and objectives, and enjoy doing so."

Woodman and Sherwood (1980a) said team building refers to interventions designed to improve effectiveness of a work group. Although this may seem a simple definition, the terms intervention and effectiveness require further analysis.

Types of Interventions

Beer (1976) divided team building interventions into four basic types based on their area of primary concern; 1) interpersonal processes, 2) goal-setting, 3) role definition, and 4) managerial grid. The managerial grid was designed for a specific purpose and later researchers replaced it with the problem-solving approach.

Team building interventions that work on interpersonal processes involve candid discussions of relationships and conflicts among team members. This approach attempts to build cohesion, assuming that teams operate best with mutual trust and open communication (Sundstrom, DeMeuse, and Futrell, 1990). According to Tannenbaum, Beard, and Salas (1992), this approach enhances team effectiveness in two ways. The first is that team characteristics can be changed. The intervention can affect the team climate by improving the levels of trust, cooperation, and cohesiveness amongst team members. The second way is improving the team members' interpersonal relationships leading to improved team processes. The goal-setting approach involves clarifying goals and objectives and identifying needed resources. It can also increase motivation and commitment through participative goal-setting (Tannenbaum et al., 1992). This approach allows for individuals to "buy in" to the group needs because they were a part of the process. Role definition interventions concentrate on clarifying role expectations, group norms, and the team members shared responsibility (Sundstrom et al., 1990). Clarifying these areas may enhance overall team cohesiveness (Tannenbaum et al., 1992). Problem-solving interventions work on task-related processes (Sundstrom et al., 1990). According to Dyer and Buller (cited in Tannenbaum et al., 1992), the problem-solving approach assumes that teams become more effective by solving problems together. This is a more general approach and can include aspects of the three approaches previously mentioned.

Each of the four team building interventions attempt to make teams more effective. The Center for Creative Leadership's research with teams indicated that there are eight characteristics differentiating effective and non-effective teams. The first six are

primarily concerned with task accomplishment. These areas include whether or not the team had a clear mission and high performance standards, a leader that placed emphasis on obtaining and securing resources, the leader's ability to assess team member technical skills, and plan and organize the direction of all resource and team functions. The last two characteristics were concerned with the group maintenance or interpersonal aspects of teams; high levels of communication and minimal interpersonal conflict (Hughes, 1993).

Common team building techniques include T-groups, role playing and simulations, paper and pencil exercises, group projects, games, discussions, and experiential learning. The following section provides a brief review of team building research.

Empirical Research

Although each type of team building intervention was described separately, most training interventions include a mix of the various types in their design. A limited review of empirical team building research reflects this with varying results.

Porras and Wilkins (1980) conducted a quasi-experimental field study designed to improve the organizational climate, leadership, group process, and overall performance of the experimental groups in a national food service company. A mix of role definition and interpersonal interventions were used in the three intervention phases. The first and second phases involved all managers and staff members. The third stage involved only the managers. Phase 1 was intended to change attitudes and behaviors through

discussion. Six months later, phase 2 began. It consisted of activities to improve intragroup relations to increase unit effectiveness, again, through meetings and discussions. Phase 3 was conducted about six months after the beginning of phase 2. The managers discussed performance problems and developed plans to resolve them. The results of the study showed little change in performance and decreased job satisfaction and commitment.

Woodman and Sherwood (1980b) conducted an experiment using 67 work groups from an engineering survey course in a posttest only control group design. They hypothesized that treatment groups would perform higher, perceive their group as being more effective and having learned more, report higher levels of participation and involvement, express greater satisfaction on group goals, group performance, and with their group. A mix of problem-solving and goal-setting intervention types were used in the six week study. The intervention followed the action research model of data gathering, feedback, and action planning. During the first part of the intervention, a consultant led discussions aimed at identifying and clarifying individual and group goals. These discussions acted as a springboard for the group to focus on how they worked together. The second part, action planning was used to focus on how the group could perform better. The results of the study showed no effect on grades and no differences in perceived learning, satisfaction with group performance, nor satisfaction with the group.

A year long organizational development project was conducted by Paul and Gross (1981) on city maintenance crews in San Diego. The intervention consisted of personal interviews, team building workshops, counseling, and management skills training. The

program was designed to increase productivity and improve morale, without allowing either goal to interfere with achievement of the other. The action research model was followed. The 3-day team building part of the intervention consisted of communication and management skills training, role clarification exercises, and exercises to identify organizational problems and plan solutions for them. This design reflects a mix of problem-solving and role definition interventions. Results showed increased service efficiency and higher job satisfaction. However, there was no change in customer satisfaction, worker absences, nor worker turnover.

Boss (1983) used 23 teams (16 experimental teams consisting of 135 people) from both the public and private sector. Each team consisted of the CEO and his/her top-level staff members. All 16 experimental teams participated in a three day team-building meeting. This intervention consisted of meetings where participants dealt with the identification and resolution of personal, interpersonal, and organizational problems, thus categorized as an interpersonal intervention. After the team building sessions, 78 of the participants began holding bimonthly private meetings between the CEO or supervisor and immediate subordinates. Results show higher ratings of group effectiveness and increased participation, involvement, and trust.

Eden (1985) randomly assigned nine of eighteen army units to undergo a three day interpersonal, role definition, and goal-setting developmental workshop. Each workshop (intervention) followed five stages. The first stage consisted of a 2-3 hour preliminary meeting one week prior to the off-site training. Stages two and three consisted of expressing expectations and contracting and diagnosing the team. Team

building in stage four included activities in conflict resolution, problem-solving, airing and relieving interpersonal friction, role negotiation, and role definition. The final stage had participants write new role descriptions and interpersonal contracts as well as other closing activities. Results show that there was no change in team performance ratings, satisfaction, communication, peer relations, nor coordination. Subjective reports, however, were very positive.

Mitchell (1986) conducted a research study based on the theory that disclosure of internal frames of reference improves group members' working relationships with one another. This team building idea is categorized as an interpersonal type of intervention. The study participants consisted of thirteen student and four manager work teams. Teams were randomly generated to one of three treatments, referred to as alignment, conventional, and control conditions. All groups accomplished a relationship inventory at the onset of the study. The inventory was used to gather information related to each person's relationship with their respective team members. The alignment intervention consisted of a 2 ½ hour session designed to help the teams gain interpersonal knowledge and understanding for one another's alignment or internal frame of reference. This was accomplished by having each team member answer a series of questions and share their answers with the group. This was followed by the group processing the information and sharing their personal feelings with the group. The conventional intervention was designed to parallel the alignment intervention. However, instead of answering another set of questions, the facilitator provided each team member feedback on the initial relationship inventory that they each took. The team then processed the information and

shared their feelings with the group. The control group did not receive any form of intervention. Results showed that both the conventional and alignment methods of team building improved interpersonal relations as compared to the control teams. Also, there was a greater effect on the alignment groups (although not statistically significant) than for the teams participating in the conventional intervention.

Tannenbaum et al. (1992) conducted a literature search of the team building research published in the 1980's. Their search resulted in finding seventeen empirical team building studies that met their predetermined criteria. Their analysis resulted in the following synopsis. The quantity of team building research had decreased but the quality of the research had improved. However, methodological concerns remained. The research still focuses on intact, white-collar teams, paying little attention to newly formed or blue-collar teams. Most studies used multiple interventions, leaving insufficient evidence to suggest that one approach or what combination of approaches is best. More studies included behavioral and objective measures, but few examined team performance. Overall, team building efforts were effective but more work needs to be done. Tannenbaum et al. (1992) strongly suggest that researchers publish both positive and negative research findings. They feel that full disclosure of methods that worked and those that did not will assist future research efforts.

Summary of Research

Although many research efforts have been undertaken in the history of conducting team building activities, very little information concerning this research is available.

Those research efforts that were published and reviewed in this section left much to be desired. There was an insufficient amount of detail included in them, especially concerning methodology, approaches, and reasons for and amount of intervention type mixes. Team building has become a buzz word in today's organizations, yet there lacks a true understanding of its purpose and value.

Experiential Learning

In November 1994, the Association for Experiential Education's Board of Directors approved this definition: "Experiential education is a process through which a learner constructs knowledge, skill, and value from direct experiences" (Luckmann, 1996). Luckmann further notes that the term "learner" includes students, clients, trainees, participants, or anyone involved in receiving the process. The definition is intentionally vague because the authors have tried to encompass all types of experiential education in its definition. In reality, experiential education can be defined in as many ways as there are people practicing it.

History

In following the definition for experiential learning, you can summarize that all learning is experiential in some context. From hunting groups that learned to work together for the kill, to apprentice blacksmiths learning the trade from a master, any learning that occurs through direct experience can potentially be referred to be experiential. However, for purposes of this study, the history of experiential learning

begins in 1920. This is the year Kurt Hahn opened the Salem School in Germany. The curriculum emphasized noncompetitive physical activities and social cooperation. This represented an attempt to create a healthy environment where youth could learn habits and develop values in fitness, skill and care, self-discipline, initiative and enterprise, memory and imagination, and compassion (James, 1990). Hahn directed the school from 1920 until 1933, when he was imprisoned by Hitler for being an outspoken opponent of Nazism. Soon after his imprisonment, England's Prime Minister and others helped arrange for Hahn's release and emigration to England.

Within a year, Hahn started another school which became one of Britain's most distinguished progressive schools, Gordonstoun. Based on his experiential learning principles, the school would become known around the world for its distinctive educational practices. Hahn was driven toward wider applications of his principles and used Gordonstoun as a staging ground for other programs, trying to discover combinations of challenging experiences that could help young folks discover new ways of organizing their lives and working with other people. One of these tangent programs was Outward Bound, established in 1941 by Hahn and Holt. The original goal was to strengthen the will of seamen as they faced staggering losses during World War II. The program proved effective and during the post-war years, the method was continued, providing personal and social growth opportunities to the general population.

In the early 1960's, Outward Bound was brought to the United States. Many schools were started including the Colorado Outward Bound School. This school focused on the personal development of adjudicated adolescents by providing wilderness

experiences to realign their values (Weigand, 1995). Since then, experiential learning has been used for a variety of purposes and conducted in a variety of settings.

Settings for Conducting Experiential Learning

Over the years both outdoor and indoor courses have been developed for conducting experiential learning programs. The descriptions and examples provided are not all inclusive, just a summary of the typical types and their respective advantages and disadvantages.

Wilderness courses (commonly referred to as adventure courses) have the participants live outdoors, usually in unique locations such as the Rocky Mountains. Activities can include mountain climbing, orienteering, kayaking, rafting, sailing, and survival, to name a few. This is the type of outdoor programming made famous by Outward Bound. Other outdoor courses are man-made and fall into one of two categories, high ropes and low ropes.

High ropes courses, as the name implies, generally consist of activities that are well off the ground and have a relatively high level of perceived risk. This type of training typically involves personal or individual development as the focus of the activity. Activities such as wall climbing and rappelling are examples of this.

Low ropes courses, on the other hand, are characterized by limited physical risk and used primarily for improving overall functioning of a group or team (Wagner, Baldwin, and Roland, 1991). Examples include activities such as *Toxic Waste*, *Acid River*, and *Blind Walk.*

Outdoor courses can and are used for newly formed teams, existing teams, and composed teams. Composed teams (since they are comprised of people who come together, receive training, and then go their separate ways) gain many of the same advantages as newly formed or existing teams, however, the team building aspects are never realized. According to Clements, Wagner, and Roland (1995), outdoor courses are particularly useful to promote team building; improving interpersonal relations, cohesiveness, trust, and homogeneity of groups. The advantages they mention are: 1) the physical aspects promote active engagement in learning, 2) participants experience real emotions, 3) novel situations help break old patterns of thinking, 4) promote experimentation with problem-solving, and 5) boost group awareness and trust. The disadvantages include high expense, difficulty in transferring the learning back to the work environment, participants worrying about safety or discrimination, liability risks, and possible ineffectiveness in addressing individual behaviors.

Indoor courses are growing in popularity for many reasons. The advantages of indoor courses include: 1) anyone can participate, they are nondiscriminatory because they do not typically require physical exertion, 2) they can be accomplished anywhere, in any weather, 3) the learning transfers more easily to the workplace, because the activities are commonly derived from real world problems, 5) the programs are relatively inexpensive, 6) the learning tends to be based on real emotions. The disadvantages concern simulated versus real situations, a less engaging environment, and participants are less likely to reveal behavioral norms and break out of traditional roles. These courses are best suited for addressing individual behaviors and specific work behaviors.

Examples of indoor activities include paper and pencil exercises, role plays and simulations, group projects, and T-groups (Clements et al., 1995).

There are many exceptions to the above descriptions that will not be elaborated on but should be mentioned. High ropes courses are typically outdoor courses involving ropes strung between trees or emplaced telephone poles. However, because of the advantages of all-weather training, high ropes courses are finding their way indoors. A general example would be placing rope ladders and rope bridges in the rafters of a gymnasium to get a similar experience as would be gained on an outdoor course. A specific example was presented in MGM 750 - Creative Leadership.

As part of the course curriculum, the entire class participated in team building activities on an indoor wall climb at a local facility. All class members had the opportunity to climb as high as they wanted, following a "challenge by choice" presentation. This method allowed each participant to push themselves without exceeding their comfort level. After the initial climbs were accomplished, a new twist was added. The group was directed to select one group member to participate in an unknown task. Once the "volunteer" was picked, he was told that he would climb the wall blindfolded. The rest of the group would provide direction, support, and feedback to the climber so that he could navigate the wall. For most in the group, this type of training was both new and refreshing. The debriefs after each activity allowed for personal reflection and shared feelings amongst the group members (Prochaska, 1996). Although no actual measurements were taken, the consensus was that the experience was both positive and effective in bringing the group closer together.

Another exception is low-ropes courses (typically outdoors) that have a portable design and can be set up wherever needed or convenient. An example of this was also presented in MGM 750 (Prochaska, 1996). Although the weather turned out favorable and the activity was conducted in the parking lot of Colorado Tech, the same experience would have been gained if it had been done in a gym or lecture hall. The portability of design allowed for flexibility. This is especially significant when implementing experiential learning activities on a tight schedule.

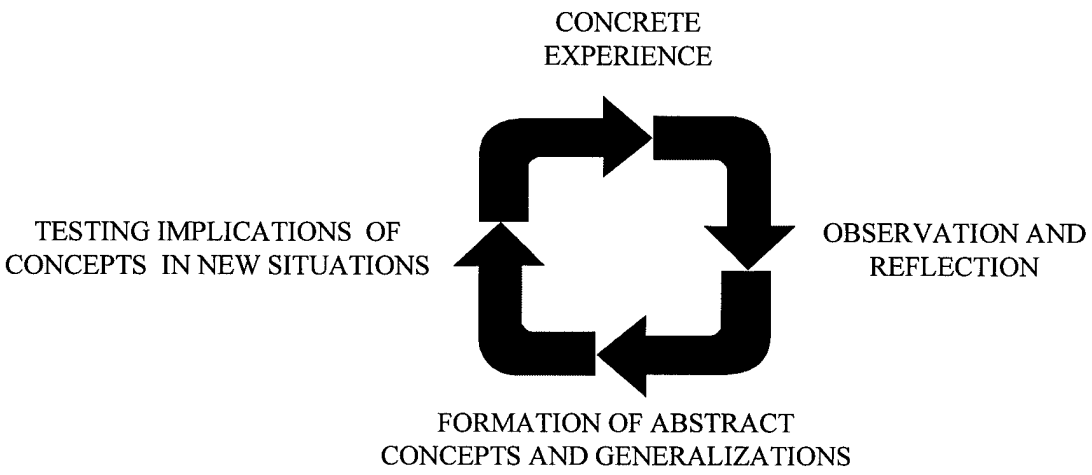
The last exception that will be mentioned concerns high and low ropes programming. New course designs are adapting activities usually associated with low ropes programming and team building and raising them to high ropes levels. This design allows for team development to occur in a higher risk environment. As the profession of experiential education becomes more sophisticated, the differentiation between indoor and outdoor experiential training may gray if not vanish altogether.

Experiential Learning Models

There are two prominent experiential learning models that provide insight to the process. The first was presented by Kolb (Sullivan and Kolb, 1995; Weigand, 1995). Kolb described the process of experiential learning as having four stages that occur in a cycle (see Figure 2.5). These are: 1) *concrete experience*, which is the basis for 2) *observation and reflection*, that is then organized or 3) *assimilated into a theory*, from which new hypotheses or implications lead to 4) *active experimentation.* This model supports Coleman's idea that the learning process is reversed as compared to traditional

training. The participant first experiences a situation, then thinks about and learns from it, followed by bringing the added knowledge into the next situation.

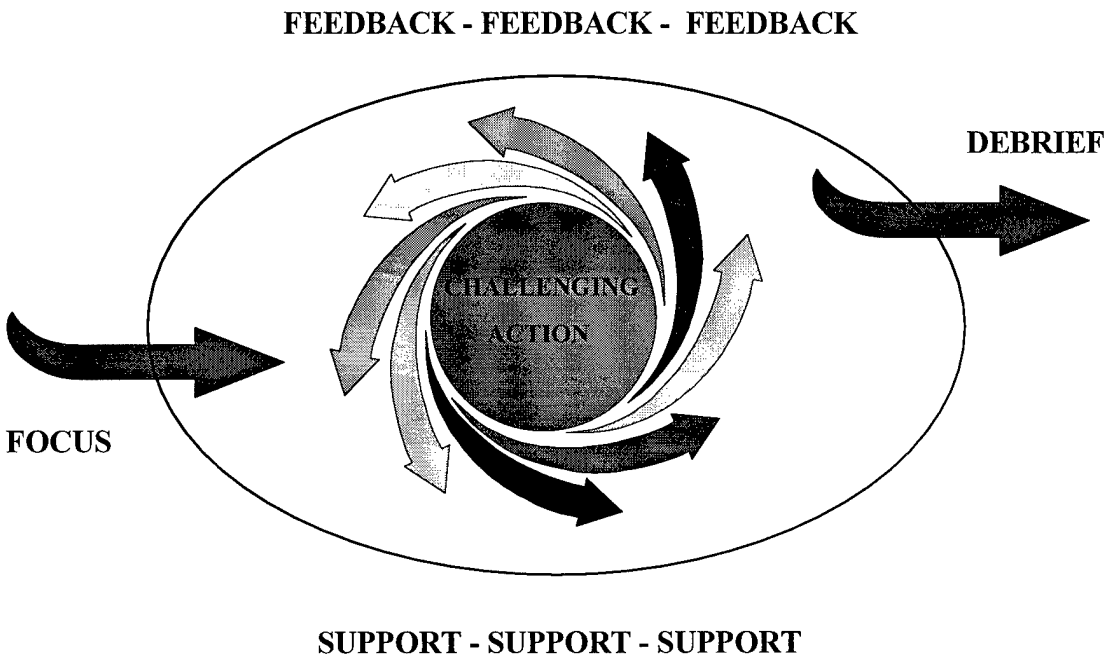
Figure 2.5. Kolb's Model of Experiential Learning (adapted from Weigand, 1995)



(Source: Weigand, 1995, 4)

The second model reviewed was presented by Joplin (1981). Her model is organized around a central hurricane-like cycle, preceded by focus and followed by debrief, in an atmosphere of support and feedback. The model is comprised of five stages where completing the fifth stage starts the first stage in the next cycle (see Figure 2.6).

Figure 2.6. Joplin's Outdoor Experiential Learning Cycle (adapted from Joplin, 1981)



(Source: Joplin, 1981, 17)

Note: Original depiction of the model shows the hurricane effect as entering from the left, going towards the middle, slowly spiraling outward, and then moving to the next cycle to the right.

The first stage, *focus*, prepares the student for the hurricane-like or challenging action stage. The *action* stage puts the responsibility on the student to take action on the problem presented, often placing the student in an unfamiliar environment that may require new skills or the use of new knowledge in a stressful situation. *Support* and *feedback* occur throughout the process, challenging the student to act on more information and continue on. In the fifth stage, *debrief*, the facilitator ensures that the

learning is recognized, articulated, and evaluated. The debrief helps the student learn from the experience and prepares the focus for the first stage of the next cycle.

Principles of the Process

Many models of experiential learning have been proposed. No matter which model you follow, Luckmann's (1996) twelve principles apply to the process. They are: 1) experiential learning occurs when carefully chosen experiences are supported by reflection, critical analysis, and synthesis; 2) experiences are structured to require the learner to take initiative, make decisions, and be accountable for results; 3) throughout the process, the learner is actively engaged in posing questions, investigating, experimenting, being curious, solving problems, assuming responsibility, being creative, and constructing meaning; 4) learners are engaged intellectually, emotionally, socially, soulfully, and/or physically; 5) results of the learning are personal and form the basis for future experience and learning; 6) relationships are developed and nurtured; 7) the provider and learner may experience success, failure, adventure, risk-taking, and uncertainty; 8) opportunities are nurtured for learners and providers to explore and examine their own values; 9) the provider's primary roles include setting suitable experiences, posing problems, setting boundaries, supporting learners, insuring physical and emotional safety, and facilitating the learning process; 10) the provider recognizes and encourages spontaneous opportunities for learning; 11) providers strive to be aware of their biases, judgments, and pre-conceptions and how they influence the learner; and, 12) the design of the learning experience includes the possibility to learn from natural

consequences, mistakes, and successes. These principles reflect how drastically different experiential learning is from the traditional classroom/lecture environment, as previously stated by Coleman (1976).

Tiers of Research

Before you conduct research in experiential learning, you must first determine what you want to measure. Are you interested in student comments? Behavioral changes? Increased productivity? Improved quality? Return on investment? To help answer these questions, Kirpatrick developed a four-tier approach for evaluating training programs (Kirpatrick and Wagner, 1995). The Kirpatrick Model provides guidelines for each of the four tiers: *reaction*, *learning*, *behavior*, and *results.*

The *reaction* tier measures customer satisfaction, how participants feel about the experience. Kirpatrick's guidelines include clarifying objectives, quantifying reactions, encouraging written responses in addition to the quantifiable ones, getting 100% of the participants to respond immediately after the program, encouraging complete and honest responses, and developing acceptable standards for the participant reactions.

The *learning* tier involves measuring attitude changes, improving knowledge, and increasing skills. Kirpatrick's guidelines include using a control group, pre- posttest design, and getting 100% response.

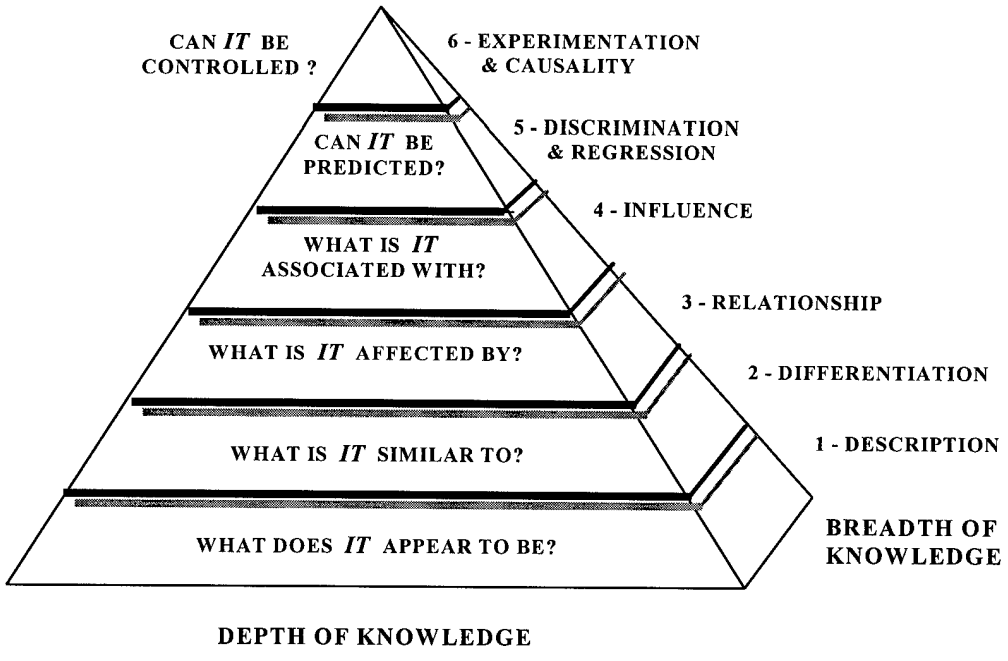
The *behavior* tier studies changes in on-the-job behavior. Kirpatrick's guidelines for this tier are using a control group, allowing time for behavioral changes to take place, pre- posttest design, surveying and/or interviewing trainees and their peers, supervisors,

and subordinates, getting 100% response or a sampling of the participants, and repeating the evaluation at regular intervals.

The *results* tier, the most complicated type of evaluation in the model, tries to determine the final results that occurred due to the training. Kirpatrick's guidelines include those mentioned above, however, he adds two more. First, you must consider the cost of repeated evaluations versus the possible benefits gained from the effort. Second, be satisfied with inferential evidence if absolute "proof" is not possible.

Another way to look at the tiers of evaluation is presented by Priest et al. (1993). Their "Question of Research" pyramid rank orders the six types of questions researchers commonly ask (see Figure 2.7).

Figure 2.7. "Question of Research" Pyramid (adapted from Priest et al., 1993)



(Source: Priest, Attarian, and Schubert, 1993, 15)

The pyramid offers a sequential approach for conducting experiential education. Priest suggests you cannot conduct research efforts at Tier 6 before a foundation of research has been conducted in the previous five tiers. Priest says most research efforts have been conducted at Tier One, *description*. This tier uses a testimonial or anecdotal approach by describing the programs and what they appear to achieve. Priest goes on to say that very few studies have been conducted at Tiers Two and Three and appear to have been conducted without clear or coordinated direction.

Reasons for little research

The experiential learning process is evolving to be one of the most dynamic human resource tools available. However, very little is known about the effectiveness or success of these training and development programs (Priest et al., 1993). Although people conducting the training are interested in evaluation, feel a need to do it, and have research and evaluation guidelines, little or nothing is done. The two primary reasons for not conducting more evaluation are time and knowledge (Kirpatrick and Wagner, 1995). First, trainers spend their time meeting organizational needs. With little pressure from top management to justify program existence, evaluation isn't given a high priority. Second, trainers don't really know how to do it. Anything beyond participant comments, the *reaction* or *description* tiers previously mentioned, exceeds their knowledge and experience. Other reasons also come into play. Priest et al. (1993) identified eight barriers to conducting experiential learning research. The barriers make research difficult and can compromise the effort. Their mention is important because a researcher's experimental design needs to consider them. This research effort has considered the

barriers and further discussion of them is presented in Chapter 5. The following is a synopsis of the eight barriers.

The first barrier states that participation in adventure training is strictly voluntary. Participants volunteer to undergo the treatment, therefore, researchers are not using randomized samples. The second barrier states that adventure training uses small groups. This causes a small "n" size when you only have one group to study. This is one reason that may researchers apply nonparametric (not as powerful) statistical analysis of the data versus parametric. The third barrier concerns the difficulty in combining several small groups to increase the sample size. This is caused by the customized nature of adventure training, meeting the needs of each group and its individual members. The fourth barrier states that research designs are difficult. Any control group may experience "spill over" contamination when experimental groups return from their treatment training. This barrier really applies to corporate groups. When you send ten people from a company, they talk about the training on their return and others hear about it. The fifth barrier involves instrumentation. Quantitative research is hampered by a lack of good instrumentation to measure the constructs of primary interest. Also, many of the available instruments provide ordinal type data, requiring the use of nonparametric statistical analysis of the data. The sixth states that using qualitative methods, as an alternative, are not as widely accepted as quantitative methods. The seventh barrier states that companies sending many employees through training are reluctant to permit research because research and evaluation may indicate the program was ineffective and money was wasted.

The eighth barrier states that their are major differences and severe criticisms concerning researchers and practitioners. Ewert (1987) clarified this gap by producing tables detailing these differences and criticisms. Tables 2.3 and 2.4 represent his work.

Table 2.3. Differences Between Researchers and Practitioners

Researcher	Practitioner
Obligation to be critical	Don't like to criticize
Searching for truth	Need to make decisions
Emotionally neutral	Emotionally involved
Information for theory development	Information for decisions
Limited by research design	Limited by cost
Working toward a perfect world	Making an imperfect world work

(Source: Ewert, 1987, 5)

Table 2.4. Criticisms Between Researchers and Practitioners

Criticisms of practitioners by researchers	Criticisms of researchers by practitioners
Never ask the right questions	Never get a straight answer
Pay little attention to advice	Too cautious, can never make generalizations
Want easy, black and white answers	Never has enough data or information
Not interested in objective truth	Retreats into research jargon
Reactive rather than proactive	"Could be" instead of "will be"
Looking for bargains	Crackpots versus capable-who can tell?
Does not comprehend the term "reliability"	Does not comprehend the term "meaningful"

(Source: Ewert, 1987, 5)

Current Research

A variety of research has been conducted on the experiential learning process. This is partly caused by the wide variety of uses of the methodology including therapy, counseling, addiction treatment, school/program orientation, human relations training, leadership training, and team development, to mention a few. However, there has been relatively little research measuring the impact experiential learning has on team development. The review for this study covers only selected studies that attempted to develop teams through experiential team building efforts.

Bronson, Gibson, Kichar, and Priest (1992) conducted a study with the intent to evaluate changes in stages of team development before and after involvement with a corporate adventure training program. Two intact work groups were selected from an aerospace engineering company. Small nonrandom sample sizes were used (control, n=11; experimental, n=17). The intervention included a three-day off-site with typical challenge course events and group initiatives. The Team Development Inventory (TDI) was used to measure changes in team development and administered pre- and post-treatment on a 5-point Likert scale. (The TDI is not copyrighted and further discussed in Chapter 4.) Data analysis consisted of ten two-way analysis of variance, one for each item on the instrument to determine whether there were significant differences ($p<.05$) in the results for the control versus the experimental group, for the pre- versus posttest, and for the interactions between each groups pre-and posttest.

Parametric statistics were applied to the data and results indicated an interaction for eight of the ten items. The experimental group mean after the treatment was

significantly higher than the pretest mean for either group and the posttest mean for the control group. Eight of the ten item statements showed positive changes for the experimental group and no changes for the control group. The emphasis area and the experimental groups pre-and posttests scores follow (all eight areas listed resulted in statistically significant change, computed values showing significance were not published nor available): group goals (2.94, 3.59), interest (2.82, 3.71), listening (2.71, 3.59), decisions (3.00, 3.59), diversity (2.65, 3.35), high standards (3.41, 4.00), celebrate (2.77, 3.53), and feedback (2.82, 3.71). No significant change was noted regarding acknowledging and confronting conflict nor in consulting one another on challenges.

Priest and Lesperance (1994) conducted research with the intent to trace the development of teamwork within intact work groups. Two separate studies were conducted. The first was concerned with the effect of adventure training and the second concerned the influence that follow-up training had on the retention of gains made in the first.

In the first study, a 15 member group underwent a 48-hour intervention in 3 days. The treatment consisted of morning lectures and afternoon and evenings experiential activities. Using the TDI with a 10-point Likert scale, participants were measured 3 times per day for a total of nine times throughout the intervention. Four follow-up measurements were taken two weeks, four weeks, three months, and six months after the training.

The second study was conducted in a similar fashion, however, 2 experimental and one control group were used (n=20 for all groups). The control group received no

training and no follow-up. One experimental group did not receive follow-up training and the other used debriefing techniques (funneling) to help them reflect on their experiences, becoming a self-facilitated group. The group from the first study chose to use strategic meetings and self initiated projects as a follow-up.

The TDI data was analyzed two ways. In the first analysis, they looked at the ten individual scale scores. Results of the first study and from the experimental groups from the second show significant increases on all ten scale measurements at the $p<0.05$ level. The following reflects the scale, pretest, and posttest scores for the first study (on a ten point scale): interest (6.01, 7.09); help and advice (4.52, 6.64); group goals (5.26, 6.44); conflict (4.67, 6.53); diversity (4.68, 6.51); listening (4.86, 6.45); standards (5.87, 6.96); decisions (4.48, 6.32); celebrate (4.8, 7.45); and feedback (3.96, 7.29). For the second analysis, the beginning and end TDI sums of item means were reported. For the first study, the overall TDI sum mean went from 49.11 at the beginning to 67.68 at the end of the 3 day session. The two experimental groups also had significant gains, from 51.57 to 70.07 for the experimental group one and from 48.64 to 68.93 for experimental group two. The control group from the second study remained unchanged. The researchers pointed out that the increases cannot be solely attributed to the outdoor learning. They summarized that a combination of lectures on teamwork and experiential team building activities worked together to cause the increases.

The second part of the study, follow-up training, had mixed results. The group that did not have follow-up training reverted to baseline measures by the end of six months. The group from the first study that chose to use strategic meetings and self

initiated projects as a follow-up maintained their level of team development. The self-facilitating group was able to increase their level of team development behaviors by using the techniques of funneling and guided reflection.

The following two studies were reviewed by Priest et al. (1993) as part of their research in group development using experiential learning methods. The original works were not available. Baldwin, Wagner, and Roland (cited in Priest et al., 1993) conducted a study to determine the effects of an outdoor challenge training program on 458 civilian employees and 13 supervisors from a military base. The intervention consisted of a series of group problem-solving initiatives. Two questionnaires were administered to collect data on a variety of group and individual measures. Results suggest the training had a moderate effect on group awareness and effectiveness and individual problem-solving. However, no significant changes were observed in trust or self-concept.

Dutkiewicz and Chase (cited in Priest et al., 1993) conducted an empirical study using MBA students. The intent was to measure the changes participants have after participating in an outdoor training course. A control group (n=43) and an experimental group (n=41) were used. Results indicated that the experimental group exhibited changes in trust, confidence in peers, group clarity, group cohesiveness, group awareness, and group homogeneity.

The last study reviewed was conducted by Priest (1996). The study compared the effects that two different team building methods had on the development of trust and its composite subscales. Three groups from a Canadian corporation in the entertainment industry was used. One of the three groups acted as a control group (n=51) and received

the training after the study was complete. One experimental group (n=49) received both high and low ropes course training. The other (n=46) received group initiative activities that have similar intent but do not use ropes. The interventions consisted of five one-day sessions over a period of five weeks. The Interpersonal Trust Inventory (ITI-o) was used to measure trust through five subscales; acceptance, believability, confidentiality, dependability, and encouragement.

Results show that both group initiatives and ropes courses were effective at improving overall trustworthiness toward or within an organization. Neither method proved more effective than the other.

Summary

Chapter 2 provided a broad overview of three areas; team development, team building, and experiential education. The team development section laid the foundation for an understanding of the theoretical concepts proposed to date. A great amount of work has been done and, with the growing emphasis on teams, more will follow. It is imperative to have an understanding and appreciation of both the past and present literature on team development before charging into ways to influence it. The team building section provided a brief overview of the common types of team building interventions, characteristics of effective and non-effective teams, and research accomplished. It served as a lead-in to the section of experiential education. In the experiential education section, a broad overview of experiential education was presented. The history, settings, prominent models, principals, tiers of research, barriers to research,

and current research efforts have been discussed. Of all the areas covered, the one most lacking in literature is research efforts. As previously mentioned, many trainers do not have the time, need, nor knowledge to conduct evaluations of their programs. Another factor was also realized. Of the many research efforts included in this review, all reported positive gains in some or all of their respective areas of interest. Tannenbaum et al. (1992) felt that many more studies have been accomplished but not published because they did not show significant change. They suggested that all research efforts be published and made available, whether significant changes are realized or not. This would allow others to study and build on their designs and applications as well as provide insight on how much research is currently being done.

Having reviewed team development, team building, and experiential education, it is time to go beyond a broad overview of each area. Chapter 3 presents an in-depth analysis of the literature, concentrating on the common themes of selected prominent team development models and team building interventions and methodologies.

CHAPTER III

ANALYSIS

In Chapter 2, many team development models and theories were discussed. The analysis presented in this chapter identifies a common theme, interpersonal relationships (or group structure, according to Tuckman, 1965), throughout several prominent team development models that are representative of the literature to date. The models receiving an in-depth review include Tuckman (1965), Hackman (1987), Glickman et al. (1987), and Kozlowski et al. (1997). Each of these models covers interpersonal processes in a unique way. Following identification and clarification of commonalties across team development models, the team building intervention and methodology of choice is conceptualized.

Team Development Analysis

Tuckman's (1965; Tuckman and Jensen 1977) work conceptualized changes in group behavior in both the social and task realm. The behavioral changes proposed relied heavily on interpersonal processes. Each stage theorized, *forming*, *storming*, *norming*, *performing*, and *adjourning,* was named for the type of interpersonal interaction that typically took place during it.

Orientation, testing, and dependence constitute the first stage, *forming* (Tuckman, 1965). Tuckman proposed that groups initially spend their time orientating themselves to

the group through testing. This testing assists in the development of both interpersonal and task behavior boundaries. During testing, dependency relationships with leaders, other group members, and preexisting group standards are established in the interpersonal realm. These areas of interpersonal interaction provide a foundation for the group to build on. Members begin to realize who they feel comfortable with, who they can depend on, and what they can and cannot do in the group.

The relationships initially developed in the *forming* stage provide team members with both "friends" and "foes" that they team up with or go against in the next stage, *storming*. The *storming* stage is where members exhibit greater emotion, resistance to the group, and have open conflicts. If *forming* was successful, *storming* is healthy in that it gets disagreements and differing viewpoints into the air so they do not fester over time. Also, if differing views do arise at a later time, the team will better handle them and the intensity will not be as great.

Once everyone's opinions are expressed, the group then moves to stage 3 (*norming*) and deals with them. If members had their say in stage 2, the resistance previously experienced is overcome and in-group feeling and cohesiveness develop, new roles are adopted, and new standards (norms) evolve.

After establishing and developing cohesiveness, norms, and roles, the group enters stage 4, *performing*. The patience and work accomplished in the previous three stages now pays off. Interpersonal relationships become the tool of task activities. They support task performance by roles becoming flexible and functional, allowing group

energy to be spent on the task at hand, and allowing all of this to occur within the established group norms (Tuckman, 1965).

Adjourning, the fifth stage, was later added to the model and has not received the notoriety of the original first four. However, this stage does address important interpersonal aspects. The work by Tuckman and Jensen (1977) discussed disbandment of groups. They realized that when a group dissolves, roles terminate and members dependency on one another reduces or goes away completely. Although this is obvious, the way and rate *adjourning* occurs could have an effect on how the group members respond to working with those team members again and their outlook on future team involvement.

Hackman's Normative Model also has a strong emphasis on interpersonal relationships. Figure 2.4 depicted a six block model. Three of these blocks, *group design*, *organizational context*, and *group synergy*, are directly concerned with group structure or interpersonal relationships.

A well-designed group, according to Hackman (1987), has four characteristics. The first two involve bringing the right number of people together (if it takes five, assign five) and ensuring they have the needed task skills. The third states that team members have interpersonal skills as well as task skills. The interpersonal skills are what allows the team to use their task skills. This is especially true in diverse teams. Hackman suggests teams should be diverse, the fourth characteristic, to exploit creativity. However, he also says that if a team is too diverse in values and perspective, they will be

ineffective. Overall, the *group design* block relies heavily on interpersonal skills and developing group norms that can make up for "less than desired" task skill and "more than desired" diversity.

Organizational context involves the availability of educational resources, information systems, and reward. The educational resources can include technical consultation and/or training, according to Hackman (1987). Although Hackman mentions only technical training, interpersonal training could also be a player in the organizational context. The information system provides the means to make resources available to those who need it. A supportive organizational reward system encourages members to try harder, provides positive consequences for work well done, and focuses on the group rather than the individual.

Group synergy relates to process losses and process gains. The intent is to minimize process losses while maximizing process gains. Process losses occur when team members consider demographic attributes or behavioral styles rather than weighting all members contributions equally (Hackman, 1987). Process gains are made when team interaction results in team learning, the whole is greater than the sum of its parts.

Hackman's clarification of the interaction between performance conditions (*group design* and *organizational context*) and *group synergy* can be seen in Figure 3.1. Ideally, a team wants to operate in an environment where the performance conditions are favorable and the group synergy is positive. Positive *group synergy* can make up for both limited or unfavorable *group design* as well as *organizational context.*

Figure 3.1. Hackman's Consequences for Task Behavior

		Group Design and Organizational Context	
		Unfavorable	**Favorable**
Synergy	**Negative**	**Amplification of the impact of performance depressing conditions**	**Failure by the group to exploit opportunities in the performance situation**
	Positive	**Damping of the negative impact of performance conditions**	**Full exploitation of favorable performance conditions**

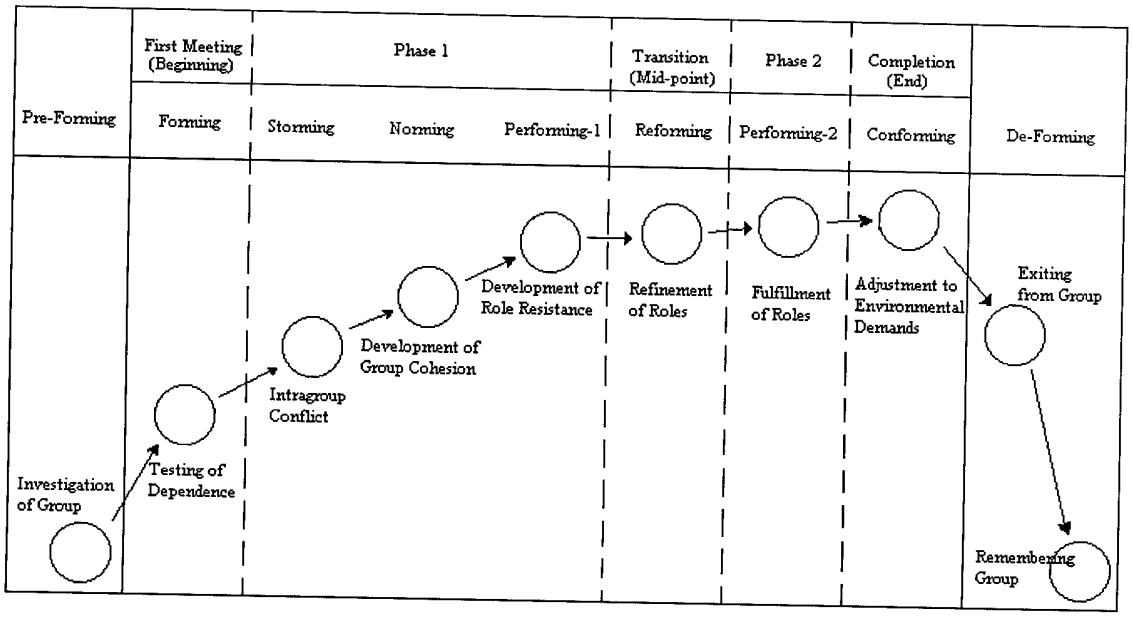
(Source: Hackman, 1987, 332)

Glickman's et al. (1987) TEAM model clearly places interpersonal relationships to the forefront. Strongly influenced by both Gersick and Tuckman, the model adapts each in a distinctive way. Referring back to Figure 2.2, a two track model was proposed, one being "Operational Team Skills Training" and the other "Generic Team Skills Training." According to the authors, in order for a training program to be successful and for the group of individuals to perform as a cohesive team, the two tracks must be separately developed and ultimately converged.

The generic skills track, shown in Figure 3.2, is devoted entirely to interpersonal relationships or generic team skills. Specific behaviors that occur throughout the "teamwork" track include coordination, effective communication, adapting to demands,

conditional behaviors, monitoring one another's performance, and giving and receiving feedback. Moving from left to right in the model, each of these behaviors should become more effective with time and experience in the group. In doing so, after the *transition* (from Gersick) or *reforming* (from modified Tuckman) phase, the team should experience the positive synergistic effect discussed by Hackman.

Figure 3.2. Generic Team Skills Track (adapted from Glickman et al., 1987)



(Source: Glickman, Zimmer, Montero, Gurette, Campbell, Morgan, and Salas, 1987, 21)

The Developmental Continuum was proposed by Kozlowski et al. (1997) after an extensive review of the existing team development literature. Their intent was to bridge the gap between existing team development theory and emerging organizational needs.

They valued existing models for their descriptions of the social and interpersonal processes. However, they concluded that these same models were derived from teams

that are much less complex than the teams in today's organizations. To overcome this limitation, their theory of team compilation is conceptualized as a developmental process that proceeds across *levels* (individual, dyadic, and team), as well as *time* (Kozlowski et al., 1997).

In recognizing that teams compile over *levels* and *time*, they linked together several literatures; socialization and skill acquisition literature for the individual level learning focus, role theory literature for the dyadic level focus, and social network theory for a team focus. After merging these literatures with existing team development literature, their result was the developmental continuum (refer to Figure 2.3). Table 3.1 explains what happens at each level (individual, dyadic, and team network) in terms of content, processes, and outcomes.

In analyzing these four prominent models of team development, it is evident that interpersonal relationships are a key factor in the development of teams. Interpersonal relationships are addressed across the spectrum of all team development models, covering areas such as roles, norms, cohesiveness, conflict, consensus, social status, quality of relationships, group synergy, and group dynamics. It is logical to assume that a group that obtains and maintains effective interpersonal relationships will be more effective than a group that does not. This is where team building comes in.

Table 3.1. Team Compilation (adapted from Kozlowski et al., 1997)

	Phase 1	Phase 2	Phase 3	Phase 4
Level	Individual	Individual	Dyadic	Team
Content	Social Knowledge	Task Knowledge	Role Knowledge	Network Knowledge
Process	Socialization -information seeking -leaders as mentors/ models -self-disclosure	Skill Acquisition -social learning -experimentation/ practice -information provision, modeling, persuasion	Role Negotiation -role eisodes -horizontal negotiations -repeated dyadic interactions	Network Repertoire -explore transaction alternatives -diagnose/evaluate -modify network -add to repertoire
Outcomes	Interpersonal Knowledge -skills/abilities -personalities -attitudes and values Team Orientation -commitment to goals -shared climate perceptions -norms	Task Mastery -competence -performance strategies -prioritize tasks Self Regulation -monitor performance -goal setting -self-efficacy -resilience to failures and ambiguity	Role Identification -role sets -activity pacing -response coordination -boundaries of responsibility Role Routinization -streamlined communication -implicit coord -personalized interactions -reduced role conflict	Continuous Improvement -mutual performance monitoring -team load balancing -mutual error detection Team Adaptability -network selection -network invention -coordination maintenance

(Source: Kozlowski, Gully, Nason, Smith, 1997)

Team Building Intervention and Methodology Analysis

Realizing the importance for team members to get along with and support one another, team building provides a progressive approach to team development. In Chapter 2, the literature review summarized that team building does many things for a team; fosters cohesion, clarifies structure, reduces conflict, accelerates the socialization process, aligns members with the organization, and improves effectiveness of work groups. The

outcomes realized from participating in team building experiences directly relate to what teams need in their development.

It is now time to turn the attention to the type of team building intervention that would be most conducive in developing teams through improving interpersonal relationships. Four common approaches to team building were discussed; interpersonal, goal-setting, role definition, and problem-solving. The interpersonal approach was said to improve levels of trust, cooperation, and cohesiveness. The goal-setting approach increased motivation and commitment by clarifying goals, objectives, and resources. The role definition approach clarified role expectations and norms. The problem-solving approach assumed teams become more effective through solving problems together and can include aspects of the other three approaches.

Because the interest lies in developing all aspects of the team (roles, norms, trust, cooperation, cohesiveness) the problem-solving approach appears to be the intervention of choice. By following a combined approach, problem-solving with aspects of the other three, all interpersonal processes can be covered.

Many team building approaches were mentioned in Chapter 2, including T-groups, role playing, simulations, experiential learning, and others. Of these, experiential learning is the method of choice for this study. Experiential learning, as referenced in Chapter 2, offers many advantages. Of particular interest are those advantages associated with an outdoor low ropes course; physical activity engages the learner, participants experience real emotions because they are entrenched in the scenario, novel situations help create new patterns of thinking, and the teams awareness and trust is boosted. The

last advantage ties directly to the problem-solving approach, experimentation is promoted with problem-solving.

Through experiential learning, the problem-solving approach should be used to conduct team building. In the team exercises, artificial problems can be solved by the team. In doing so, the team develops their relationships with one another through the various interpersonal processes such as communication, dependence on one another, role clarification, and conflict resolution, to name a few.

Because it is an artificial environment, the experiential learning process relies heavily on the facilitator. The facilitator must carefully observe the teams actions to ensure there is a transfer of experience from the exercise to the real world. Typically, this is done through the use of metaphors. The metaphors provide a logical link between what the team experienced during the exercise and how they relate to the team's workplace environment. The experiential learning methodology, as seen through both Kolb's and Joplin's model, reflects this cycle of experiencing situations and discussing the lessons learned and how they apply to the team beyond the training experience.

These analyses selected portions of the literature review that are most relevant to this research effort. The team development analysis resulted in realizing that interpersonal relationships are key to developing teams. The team building analysis identified that a low ropes course intervention using the problem-solving approach should be used in developing teams. It is now time to put the pieces together in terms of a curriculum of training and ways to measure its effect.

CHAPTER IV

SYNTHESIS

Chapter 3 provided an in-depth analysis of four prominent team development models and team building interventions and methodologies. The findings reflect that interpersonal processes are emphasized throughout the literature and are an integral part of every model and that experiential team building may prove to be the training intervention of choice to enhance team development. This chapter develops the process used to conduct experiential team building on the Leadership Reaction Course, discussing the curriculum and facilities. Following this, the HMX-2 and TDI instruments are discussed to show their applicability in measuring the effect of the experiential training curriculum.

In synthesizing the literature review on team development, team building, and experiential learning, the following can be summarized:

To enhance team development, conduct team building exercises on a low ropes course using the problem-solving intervention approach.

Process

The Leadership Reaction Course (LRC) is USAFA's primary low ropes course. This section provides a synopsis of relevant material taken from a Technical Report

written by Garvin, Nason, and Otto (1996). Areas covered that make up the process include the curriculum, schedule of training, and course description. This fully discloses all relevant aspects of the experiential team training used in this study, as recommended by Tannenbaum et al. (1992).

Curriculum

The Leadership Reaction Course is used to conduct the capstone exercise for BS 310. The experiential team building curriculum provides students the opportunity to practice and observe leadership, followership, communication, problem-solving, and teamwork concepts. The leadership objectives include being able to: organize groups into cohesive teams that have the ability to solve complex problems; direct a team to accomplish the task, allocate resources, track progress, gather information, and make decisions; and realize the importance of listening to subordinates and peers. The followership objectives work hand in hand with the leadership objectives and include being able to: provide feedback; commit to the team rather than self; work in harmony; and disagree without causing unnecessary disruption. The communication objectives include refining both their verbal and non-verbal communication skills, assertiveness, and conflict resolution techniques. The problem-solving objective is to provide an opportunity for students to practice their problem-solving skills in complex situations under strict time constraints. The teamwork objective focuses on teaching the students to put personal conflicts and problems aside to accomplish the task at hand. With expert facilitation provided by the Department of Behavioral Sciences and Leadership

instructors, students gain first-hand experience with each of these concepts, enhancing the students ability to work in and function as teams.

Each training session lasts about 3 hours and participants attempt between six and nine activities with their team. The facilitators tend to follow Joplin's experiential learning cycle in that they first focus the team on the task, explaining the objective and rules. They then direct the team to attempt and/or solve the problem. When the task has been completed or the time limit has expired, the facilitator debriefs the team thoroughly using both their experience as a facilitator and a facilitator guidance sheet. The guidance sheet (see Appendix A) provides questions to ask and/or apply, memory joggers, and wrap up questions, all designed to transfer the experience back to the workplace. This process is repeated throughout the training with each station serving as a cycle. Through repeated cycles, the team should develop, becoming both more effective and efficient. Appendix B shows an example of a typical afternoon training session.

Course Description

The LRC is classified as a low ropes course comprised of twelve separate activities or stations. Each station is surrounded by 15-foot cement walls. These walls serve several purposes. They free participants from distractions, prevent other teams from observing tasks not yet attempted, and provide a foundation for walkways that facilitators and spectators use to observe the training. Each station is designed to follow the problem-solving intervention approach discussed in previous chapters. This allows the other approaches (role, goal, and interpersonal) to be integrated with the problem-

solving approach. A specific example of this involves the role approach. The role approach is realized through the problem-solving method in that at times, the team leader emerged from the peer group and at other times the team leader was selected by the facilitator. Also, as teams accomplished successive activities, they developed expectations of one another, thus, developing roles. Appendix C provides the name, a picture(s), number of participants required, equipment needed, set-up, task objectives, safety considerations, fouls, penalties, and solutions for each of the 12 activities. The following provides a brief description of the twelve stations.

Station 1, Out Like Flint, requires seven team members to use ropes and a ladder to negotiate a wall without touching the sand in front or any part of the facility painted red. Team members on the ground cannot talk to members on the wall. All team members must get to the other side in 15 minutes.

Station 2, Over the Fence, requires seven team members to use a rope and boards to cross a fence. The fence cannot be touched by team members or equipment. All team members must cross, set mock explosive charges, and return within 15 minutes.

Station 3, Ho Chi Minh Trail, requires nine team members to use ropes and a plank to cross a road without touching it. While crossing, they must pick up a box of tools that lie in the middle of the road and take it with them. All members must cross in 15 minutes.

Station 4, Wall Banger, requires six team members to negotiate a large structure using only a rope and block. The entire team must move from the starting platform, through the tower, and over the far wall in 15 minutes without touching the ground.

Station 5, Bosnian Rope Bridge, simulates crossing a collapsed bridge. Using only one plank, a seven member team must cross the bridge and scale a wall while carrying a box with them. The entire team and box must make it to the far side of the wall in 15 minutes.

Station 6, Ground Zero, requires a six person team to negotiate an obstacle, climb a wall, and cross a "raging stream." The team must cross the far side of the stream in 15 minutes carrying all equipment with them.

Station 7, Medivac, requires a seven person team to cross the remains of a bridge using planks. The entire team must cross, carrying a stretcher with a dummy on it and all equipment, in 15 minutes.

Station 8, Dr. No's Laboratory, requires a seven person team to use poles and rope to cross a double fence carrying a 55 gallon barrel without touching the fences or the area between them. The team has 15 minutes to cross and all equipment must be taken with them.

Station 9, Cam Rahn Bay, requires a nine person team to cross a bridge using large planks to deliver a 55 gallon barrel. All team members must cross in fifteen minutes, deliver the barrel, and ensure they brought enough of the equipment with them to be able to cross back at a later time.

Station 10, Cliffhanger, requires an eight person team to cross a "stream of quicksand" carrying an "injured" team member that is unconscious. Using ropes and other equipment, the team must cross in 15 minutes.

Station 11, Barrel Roll, requires a nine person team to cross a "canyon" using ropes and a plank. The entire team, all equipment, and a 55 gallon barrel must reach the other side in 15 minutes.

Station 12, Baghdad Sewers, requires an eight person team to negotiate culverts and use planks to traverse a water hazard on the far side of the obstacle. The team has 15 minutes to make it to the far side, carrying all equipment and a box with them.

These brief descriptions show a typical way to use the stations. Each station can also be modified or changed to emphasize different areas of development. Some of these ways include changing time constraints (emphasizing efficiency), not allowing participants to verbally communicate (emphasizing nonverbal communication), adding unnecessary resources as distracters (emphasizing use what you need, not what you have), and adding or subtracting the number of participants (emphasizing the affect group size has on task completion).

Instrumentation

The experiential team building curriculum described above provides a thorough explanation of the training intervention used in this study. It is now time to turn the attention to the two instruments (the HMX-2 and TDI) used to measure the desired learning outcomes and effect of the training. The following paragraphs provide background information on the development of each instrument and the adaptations of them for use in this study.

Horizontal Team Member Exchange II (HMX-2)

The HMX-2 is a direct adaptation from Nason's (1995) Horizontal Team Member Exchange (HMX). After reviewing the Leader-member Exchange, Team Member Exchange, and other constructs, Nason suggested that a new approach was needed to understand the dynamics and performance of leaderless teams. The HMX construct focuses on the development of team relationships through dyadic exchanges. To measure the construct, he developed 14 questions (concerning performance, liking (affection), trust, and a global feeling of overall relationship quality) rated on a seven point Likert scale. He proposed that teams with higher quality exchange relationships will be more productive and satisfied, key elements in team development. The HMX was shown to have an internal consistency estimate of reliability (coefficient alpha) of 0.96. The adapted version was a joint effort between Nason and the researcher, allowing the construct to best fit the experiential learning process. Reliability analysis for this version are discussed in Chapter 6 and the instrument is shown in Appendix D.

Team Development Inventory (TDI)

In Chapter 2, a team development model by Kormanski and Mozenter (1987) was discussed. For each of the five stages of their model (awareness, conflict, cooperation, productivity, and separation) they identified a specific task and relationship outcome. From these ten outcomes, they created the Team Development Rating Scale that allowed team members to assess the effectiveness of the team's functioning. The scale consisted of ten statements, one for each outcome, designed to monitor a team's progress over time.

The scale was then adapted by Bronson for evaluating the progress of corporate adventure training, naming it the Team Development Inventory. It has established face validity and an equivalent forms reliability of 0.95 (Bronson et al., 1992). Since its creation, the TDI has been used in many ways. Bronson et al. (1992) used a five point Likert scale while Priest and Lesperance (1994) had participants place an "X" on a line with values ranging from 0 to 10. Overall, the instrument has proven to consistently measure changes in team development.

Appendix E shows the adapted form of the Team Development Inventory used in this study. Modifications were made for several reasons. First, the questions are answered on a seven point Likert scale, where 1 is equivalent to strongly disagree and 7 is equivalent to strongly agree. A seven point scale was used to remain consistent with the HMX-2. Second, the instrument began with a scenario for the participants to consider, much like the scenarios they would encounter at each station. Third, only eight items of team development were measured; interest, conflict, listening, diversity, high standards, help and advice, celebrating, and feedback. Two questions were not used, group goals and group decision making. The student groups used in this study had neither group goals nor group decision making beyond the training intervention. Reliability analysis for this version are discussed in Chapter 6.

The synthesis of Chapters 2 and 3 have provided an experiential training curriculum to be conducted on a low ropes course. Additionally, two instruments have been adapted to measure the effect of the training. The TDI has been used many times before. A new instrument, HMX-2, has been jointly developed by

Nason and the researcher for use in this study. This is the first time the HMX construct has been used to measure experiential team building.

Having framed the process and measurement instruments, Chapter 5, Validation, provides the experimental design to empirically test the use of the LRC in the BS 310 course.

CHAPTER V

VALIDATION

Empirical research efforts require an experimental design. The experimental design that follows builds on the previous chapters and ensures all relevant factors are considered in an orderly and complete manner, including research considerations, design considerations, and analysis considerations. The eight barriers to conducting research in experiential learning identified by Priest et al. (1993) are also discussed.

Research Considerations

There are five areas of research considerations addressed below. They include the statement of the problem, identification of the dependent and independent variables, the factors to be varied, and the formulation of the decision rule. These areas relate to the general nature of the information used to analyze the research questions.

Statement of the Problem

Teams are being used and integrated into organizations every day. The military, as well as many other organizations, rely on teams to accomplish the mission. Unfortunately, little emphasis is placed on training the individual members to work together as a team. Part of the problem is the lack of awareness of how teams develop. Another part is that the study of teams and their development has not kept pace with

organizational needs. This research effort adds to the team development body of knowledge by evaluating the effect experiential team building on a low ropes course has on team development. The general hypothesis is:

> Experiential education conducted on a low ropes course positively affects team development.

Identification of the Variables

Based on the literature, a pretest posttest design with an experimental and control group will be used. The dependent variables are the respective scores from the Team Development Inventory and the Horizontal Team Member Exchange II instruments. The independent variable is the experiential team building intervention on the Leadership Reaction Course.

Factors to be Varied

The factor to be varied, the independent variable, is the training on the Leadership Reaction Course discussed in Chapter 4. Training consists of about 3 hours of experiential team building. The experimental group completed the posttests about 1 week after the training intervention. The control group also received the training, however, they completed their posttests prior to receiving training.

Formulation of the Decision Rule

The use of the terms affect and does not affect in the specific hypotheses statements (covered in a later section) implies a two tailed test is used. The decision rule is then: if the $CV_{Lower} \leq TS \leq CV_{Upper}$, choose H_0, otherwise choose H_1. This decision rule states that if the test statistic falls between the lower and higher critical values (the acceptance region) the null hypothesis (H_0) is accepted. If the test statistic is outside the critical value range (the rejection region) the null hypothesis is rejected and the alternative hypothesis (H_1) is accepted (Kenkel, 1996).

Note: The abbreviations "CV" and "TS" stand for critical value and test statistic, respectively.

Design Considerations

The design considerations consist of four areas relating to the statistical characteristics used to analyze the research questions. They include the number of observations, order of experimentation, choice of survey factor levels and method of randomization, and level of measurement.

Number of Observations

The site for this research is the United States Air Force Academy, Colorado Springs, Colorado. Based on students enrolled in Behavioral Sciences and Leadership 310 (BS 310) for the 1997 Spring semester, the population consisted of 311 students.

These students were assigned to one of twenty available classes or sections for the course. All participants signed a consent form (Appendix F).

Order of Experimentation

Students participating completed questionnaires at two points in time, approximately one month apart. The data collection (pretest and posttest) occurred during normal class time and was administered by the respective section instructor. Two instruments were used in this research effort, the Horizontal Team Member Exchange II (HMX-2) and the Team Development Inventory (TDI). A full discussion of the instruments was provided in Chapter 4.

Choice of Survey Factor Levels and Method of Randomization

The survey factors are quantitative in nature and allow for statistical analysis. Assignments to the control and experimental groups was not done randomly. All students enrolled in BS 310 are randomly assigned to one of the twenty sections. From there, the sections were assigned to either the experimental or control group. The assignments were based on two factors. First, an attempt was made to get approximately the same number of participants in each group. Second, some instructors teach more than one section. Instructor bias was reduced by assigning half of his/her sections to the control group and the other half to the experimental group. When an instructor had an odd number of sections, an unequal split occurred.

Level of Measurement

The instruments used in this study provided ordinal-type data versus interval-type data. Therefore, parametric statistics and the underlying assumptions of a normal distribution cannot be made. Nonparametric statistics were required to analyze the data sets.

Analysis Considerations

The general hypotheses stated in the Research Considerations section will now be clearly defined in specific terms, followed by a discussion of the level of significance, the test statistic, and the test statistic assumptions.

Null and Alternative Hypothesis for each Research Question

Two hypotheses are stated and analyzed. The first refers to the HMX-2 instrument and the second refers to the TDI. The first hypothesis directs an analysis of the changes in pretest and posttest averages of the overall score from the Horizontal Team Member Exchange II, determining if the training had an effect or not. Each of the 14 survey item scores are added together and then divided by 14 to determine the respective pre- and posttest averages for both the experimental and control groups. The difference between the averages for each group is then tested for significance. In formal terms:

H_{01}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy does not affect team development as measured by the Horizontal Team Member Exchange II instrument.

H_{11}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy affects team development as measured by the Horizontal Team Member Exchange II instrument.

The second hypothesis directs an analysis of the changes in pretest and posttest averages of the overall score from the Team Development Inventory, determining if the training had an effect or not. Each of the 8 survey item scores are added together and then divided by 8 to determine the respective pre- and posttest averages for both the experimental and control groups. The difference between the averages for each group is then tested for significance. In formal terms:

H_{02}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy does not affect team development as measured by the Team Development Inventory.

H_{12}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy affects team development as measured by the Team Development Inventory.

Level of Significance

The level of significance used in this analysis is 0.05. This means that there is a five percent chance of rejecting the null hypotheses when the null hypotheses is correct (committing a Type I error). This level was chosen based on the previous experiential team development research efforts presented in Chapter 2. In each study a significance

level of 0.05 was used (Bronson et al., 1992; Priest and Lesperance, 1994; Priest et al., 1993; Priest, 1996).

Test Statistic

The Wilcoxon Matched-Pairs Signed Rank Test was used to analyze the data in this study. Since both the control and experimental groups were tested twice on the dependent measure (the HMX-2 and TDI instruments), this test was most appropriate. The test determines if the difference between matched groups is significant by comparing the pretest and posttest scores. It works like the parametric paired *t* Test and with a large sample, z is the test statistic (Thomas and Nelson, 1990). The analyses will include pretest and posttest differences between the control and experimental groups for both instruments.

Test Statistic Assumptions

The assumptions for the Wilcoxon Matched-Pairs Signed Rank Test are (Thomas and Nelson, 1990):

1. The population distribution is unknown, normality cannot be assumed. Since there is no previous knowledge about the distribution of the participants team development level regarding the two instruments used, this assumption is met.
2. The data are ordinal level. The scale used in each instrument ranges from Strongly Disagree (1) to Strongly Agree (7). This assumption is met.

3. The two samples are related. This assumption is met because each participant completed a pretest and posttest, producing the matched-pairs.

Discussion of Barriers

The following paragraphs review the eight barriers identified by Priest et al. (1993) that can compromise experiential education research efforts. A brief explanation on how this study attempted to overcome them follows each barrier.

The first barrier states that participation in adventure training is strictly voluntary. Participants volunteer to undergo the treatment, therefore, researchers are not using randomized samples. All students enrolled in BS310 are required to participate in the training as part of the course requirements. Although all students participated in the training, not all volunteered to complete the surveys.

The second barrier states that adventure training uses small groups, providing small sample sizes. This causes most researchers to apply nonparametric analysis of data versus parametric. Although a large sample was used in this study, the instruments used provided ordinal data, therefore, nonparametrics were applied.

The third barrier concerns the difficulty in combining several small groups to increase the sample size because adventure training is customized to meet the needs of each group and its individual members. This was overcome by all groups receiving the same training curriculum, allowing the eight sections assigned to the experimental group and the eight sections assigned to the control group to be combined, forming large experimental and control groups.

The fourth barrier states that research designs are difficult. Any control group may experience "spill over" contamination when experimental groups return from their treatment training. This barrier really applies to corporate groups. Corporations cannot send all of their groups through in a short time frame and training is normally spread out over weeks or months. When those receiving training return, there is ample time for others to hear about it. The students used in this study will all receive training in a two day time frame. There will be little time for any "spill over" to occur. Also, the control group will have already completed their posttests prior to the training dates.

The fifth barrier involves instrumentation. Quantitative research is hampered by a lack of good instrumentation to measure the constructs of primary interest. Two instruments were used in this study. The Team Development Inventory and Horizontal Team Member Exchange II instruments both have great potential in measuring team development. By furthering research using the TDI and beginning research using the HMX-2, instrumentality concerns may go by the wayside.

The sixth states that using qualitative methods, as an alternative, are not as widely accepted as quantitative methods. Qualitative methods will not be used.

The seventh states that conducting research on companies sending many employees through team training are reluctant to permit research. This is partly caused because those that hire the training consultants fear that the program may prove statistically insignificant, showing they wasted valuable training dollars. This is not a factor in this educational environment, additional money is not spent to accomplish this

training. Experiential training has slowly become a reality at USAFA throughout many areas including team development, leadership training, and human relations training.

The eighth concerns the gap between researchers and practitioners. For this effort, this gap does not exist. The researcher as well as two committee members are active practitioners of the experiential learning process.

This chapter has detailed the experimental design listing the research, design, and analysis considerations for the study. The eight barriers to conducting experiential education and how this study handled them was also discussed. It is now time to compute and discuss the results of this study.

CHAPTER VI

RESULTS

In this Chapter, the results of the study are presented. Five areas will be covered including the final data set, scale reliability, basic statistics, review of the test decision rule, and computing the test statistics for each hypothesis and arriving at a decision.

Data Set

There were 311 students enrolled in BS 310 for the 1997 Spring semester. These students are randomly assigned to one of twenty available classes or sections for the course. Of the twenty sections, four decided not to participate in this study leaving 16 sections with approximately 242 students. Of the 242 students, complete sets of data were collected on 127 students. Reasons for attrition include being absent for the pretest, posttest, and/or intervention, or not volunteering to complete the surveys.

The final data set for the control group consisted of 68 students, 56 males (82%) and 12 females (18%). The final data set for the experimental group consisted of 59 students, 50 males (85%) and 9 females (15%). All analyses are conducted on this final data set using SPSS 7.0.

Scale Reliability

The alpha coefficient, usually referred to as Cronbach's coefficient alpha, yields an internal-consistency estimate of reliability (*r*). It is calculated by finding the sum of the variances for trials and then computing the variance for the total. The higher the alpha coefficient, the better (Thomas and Nelson, 1990). According to Anastasi (1988), reliability coefficients ranging from the .8s to .9s are desirable because more of the score variance is attributed to true variance in the trait measured. For example, a reliability coefficient of .90 signifies that 90% of the variance in test scores depends on true variance in the trait measured, and 10% depends on the error variance. The error variance for coefficient alpha is caused by content sampling (or item sampling) and content heterogeneity. Because the HMX-2 and TDI instruments used in this study were adapted versions, a pilot study was conducted to determine their internal-consistency reliability estimates. With N = 43, the alpha coefficients were .97 and .89 for the HMX-2 and TDI instruments, respectively. Additionally, a second analysis was conducted to compute the reliability estimates based on deleting one question from the instrument at a time, and re-computing reliability estimates. By computing these values, you can see the individual questions impact on the overall reliability. All reliability computations were in the .8s and .9s and are reported in Table 6.1 and 6.2. Based on these high internal-consistency reliability estimates, the HMX-2 and TDI instruments were used as adapted.

The alpha coefficients for both instruments were computed again using the final data set of N = 127. Scale scores for both the HMX-2 and TDI instruments are presented in Tables 6.3 and 6.4.

Table 6.1. Pilot Study Reliability (HMX-2)

Variable	*r*	*r* if item deleted
HMX-2 Pilot Study (N=43)	.9682	
Question 1		.9676
Question 2		.9662
Question 3		.9660
Question 4		.9660
Question 5		.9651
Question 6		.9645
Question 7		.9669
Question 8		.9653
Question 9		.9654
Question 10		.9663
Question 11		.9663
Question 12		.9654
Question 13		.9648
Question 14		.9651

Table 6.2. Pilot Study Reliability for (TDI)

Variable	*r*	*r* if item deleted
TDI Pilot Study (N=43)	.8879	
Question 1		.8790
Question 2		.8835
Question 3		.8685
Question 4		.8788
Question 5		.8948
Question 6		.8623
Question 7		.8627
Question 8		.8566

Two types of calculations were conducted. First, an overall instrument scale score was determined using both the pretest and posttest data (Table 6.3). The *r* value for the

HMX-2 was .96. The *r* value for the TDI was .91. These estimates are consistent with the pilot study findings and reflect very reliable instruments. The second set of calculations determined the reliability estimates for each instruments pretest and posttest use and is presented in Table 6.4. The *r* values were also consistent with the pilot study.

Table 6.3. Overall Scale Reliability

Variable	*r*	*r* if item deleted (time 1)	*r* if item deleted (time 2)
HMX-2 (N=127)	.9646		
Question 1		.9644	.9624
Question 2		.9642	.9631
Question 3		.9639	.9630
Question 4		.9640	.9626
Question 5		.9649	.9632
Question 6		.9638	.9628
Question 7		.9635	.9627
Question 8		.9632	.9624
Question 9		.9636	.9626
Question 10		.9640	.9628
Question 11		.9640	.9631
Question 12		.9637	.9629
Question 13		.9633	.9627
Question 14		.9635	.9625
TDI (N=127)	.9092		
Question 1		.9011	.9026
Question 2		.9077	.9051
Question 3		.9030	.8971
Question 4		.9010	.9012
Question 5		.9087	.9079
Question 6		.9052	.9014
Question 7		.9067	.9035
Question 8		.9057	.8998

Table 6.4. Individual Scale Reliability

Variable	*r*	*r* if item deleted
HMX-2 Pretest (N=127)	.9318	
Question 1		.9291
Question 2		.9271
Question 3		.9277
Question 4		.9262
Question 5		.9257
Question 6		.9261
Question 7		.9280
Question 8		.9269
Question 9		.9282
Question 10		.9319
Question 11		.9261
Question 12		.9247
Question 13		.9236
Question 14		.9256
HMX-2 Posttest (N=127)	.9681	
Question 1		.9651
Question 2		.9650
Question 3		.9665
Question 4		.9657
Question 5		.9649
Question 6		.9647
Question 7		.9665
Question 8		.9669
Question 9		.9653
Question 10		.9674
Question 11		.9660
Question 12		.9661
Question 13		.9654
Question 14		.9550

Table 6.4. Individual Scale Reliability (cont)

Variable	*r*	*r* if item deleted
TDI Pretest (N=127)	.8327	
Question 1		.8010
Question 2		.8352
Question 3		.7991
Question 4		.7993
Question 5		.8249
Question 6		.8136
Question 7		.8165
Question 8		.8124
TDI Posttest (N=127)	.8839	
Question 1		.8703
Question 2		.8780
Question 3		.8552
Question 4		.8641
Question 5		.8845
Question 6		.8380
Question 7		.8755
Question 8		.8606

Basic Statistics

It is now time to begin the preliminary analysis of the data. The first areas to consider are the mean, median, and mode. The mean is the mathematical average of the data set. It is equal to the sum of all observations divided by the number of observations in the set. The median is the measure of the centrality of the observations. Half the data lie below this point and half lie above. The mode of the data is the value that occurs most frequently. When the mean, median, and mode are equal, the data set is said to be

normally distributed and symmetric (Aczel, 1996). Table 6.5 shows the mean, median, and mode for the pretest and posttest for the HMX-2 and TDI instruments.

Table 6.5. Mean, Median, and Mode

	HMX-2			TDI		
	Mean	Median	Mode	Mean	Median	Mode
Control Pretest	5.73	5.93	5.93	5.32	5.44	6.00
Control Posttest	5.69	5.86	6.00	5.34	5.44	5.75
Experimental Pretest	5.73	5.86	5.86	5.41	5.50	5.63
Experimental Posttest	5.85	6.00	6.00	5.60	5.75	6.00

The mean, median, and mode values are not equal, therefore, the data are not symmetric. This is where skewness calculations need to be considered. Skewness is a measure of the degree of asymmetry of the distribution and distributions can be skewed to the left or right. When the distribution stretches to the left more than it stretches to the right, it is said to be left-skewed. Right-skewed distributions stretch more to the right. Another measure to consider is kurtosis. Kurtosis is the flatness or peakedness of a distribution. Flatter distributions are called platykurtic and peaked distributions are called leptokurtic (Aczel, 1996). The skewness and kurtosis computations are provided in Table 6.6 and provide a means to compare the distributions of the sets of data.

Table 6.6. Skewness and Kurtosis Computations

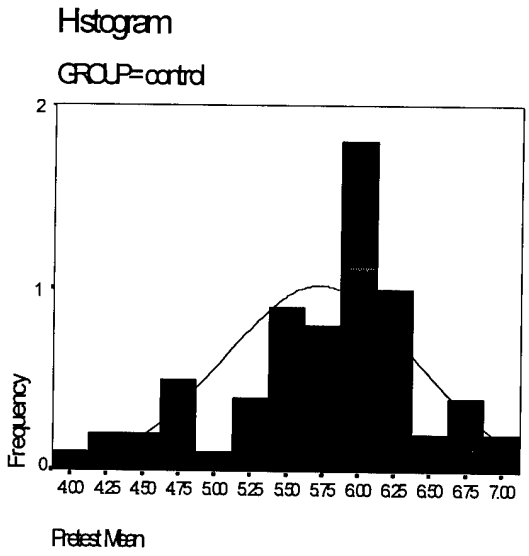
	SKEWNESS		KURTOSIS	
	TDI	HMX-2	TDI	HMX-2
Control Pretest	-.551	-.590	-0.018	0.25
Control Posttest	-.496	-1.715	-0.032	4.5
Experimental Pretest	-.877	-.564	2.306	0.208
Experimental Posttest	-.511	-.679	-0.247	0.758

Note: No action was taken to transform the variables to correct skew and kurtosis values greater than 1.0 or less than -1.0 because normality assumptions were not made, hence the use of nonparametric statistics.

Figures 6.1 through 6.8 provide histograms of the data sets. Each histogram has the normal curve overlaid to show how each data set compares to the normal distribution. Along with each figure, the mean, median, mode, skewness, and kurtosis calculations are provided. Again, for variables that are normally distributed, most observations are concentrated towards the middle of the distribution and are symmetric. As the distance from the middle increases, the frequencies and relative frequencies decrease equally on both sides. When a distribution is not symmetric, it is said to be skewed (Kenkel, 1996). The skewness of the distribution describes the direction of the hump when the distribution is not normal. If the hump is to the left and the long tail to the right, the skewness is positive. If the hump is to the right and the long tail to the left, the skewness

is negative (Thomas and Nelson, 1990). This description also provides insight to the relationship between the mean, median, and mode. For a normal distribution the mean = median = mode. If the distribution is skewed to the right, the mode < median < mean. If the distribution is skewed to the left, the mean < median < mode (Kenkel, 1996).

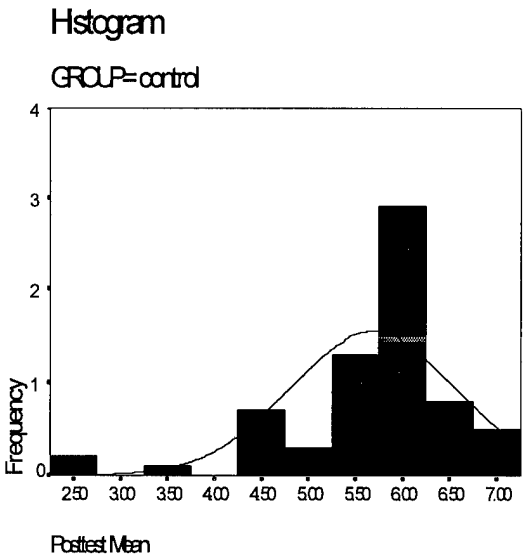
Figure 6.1. Control Group HMX-2 Pretest Histogram



Mean = 5.73
Median = 5.93
Mode = 5.93

Mean<Median≤Mode
Skew (-.590) - skewed left
Kurtosis (0.25) - more peaked

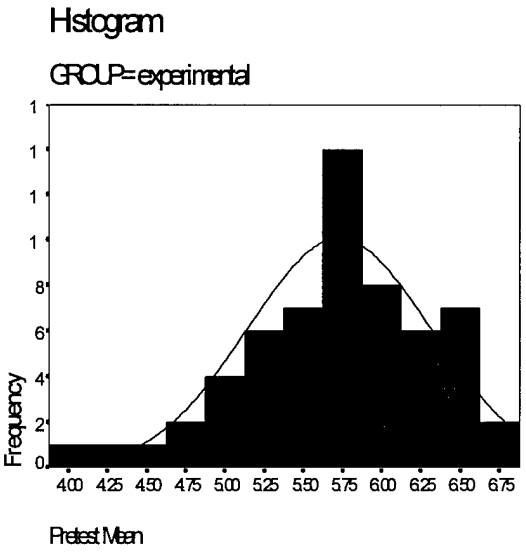
Figure 6.2. Control Group HMX-2 Posttest Histogram



Mean = 5.69
Median = 5.86
Mode = 6.00

Mean<Median<Mode
Skew (-1.715) - skewed left
Kurtosis (4.5) - more peaked

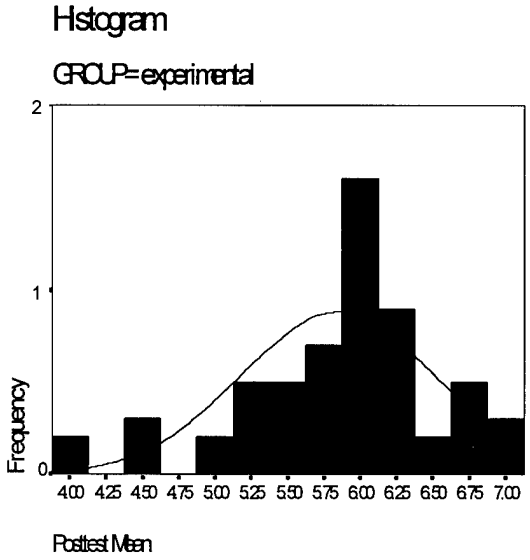
Figure 6.3. Experimental Group HMX-2 Pretest Histogram



Mean = 5.73
Median = 5.86
Mode = 5.86

Mean<Median≤Mode
Skew (-.564) - skewed left
Kurtosis (0.208) - more peaked

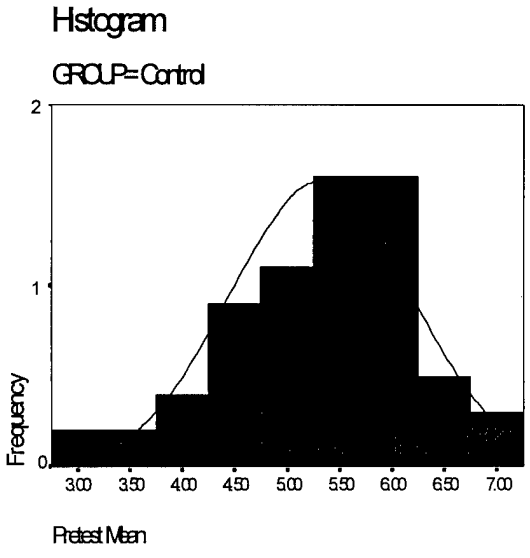
Figure 6.4. Experimental Group HMX-2 Posttest Histogram



Mean = 5.85
Median = 6.00
Mode = 6.00

Mean<Median≤Mode
Skew (-.679) - skewed left
Kurtosis (0.758) - more peaked

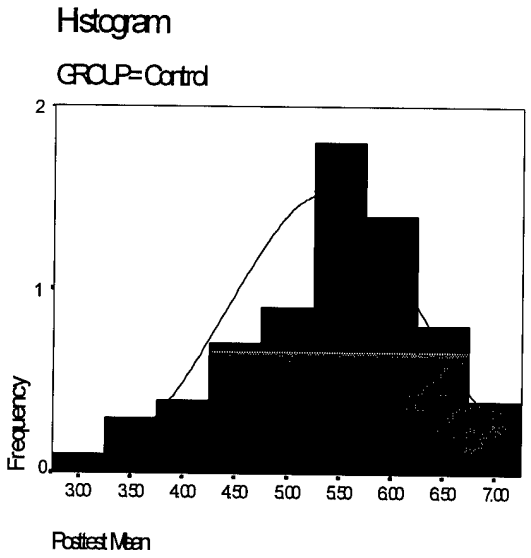
Figure 6.5. Control Group TDI Pretest Histogram



Mean = 5.32
Median = 5.44
Mode = 6.0

Mean<Median<Mode
Skew (-.551) - skewed left
Kurtosis (-0.018) - flatter

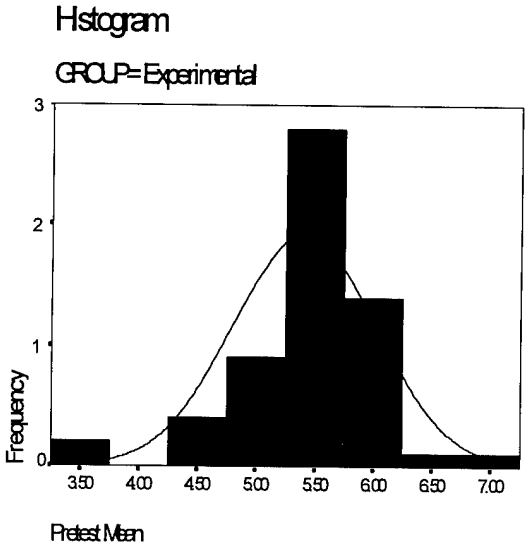
Figure 6.6. Control Group TDI Posttest Histogram



Mean = 5.34
Median = 5.44
Mode = 5.75

Mean<Median<Mode
Skew (-.496) - skewed left
Kurtosis (-0.032) - flatter

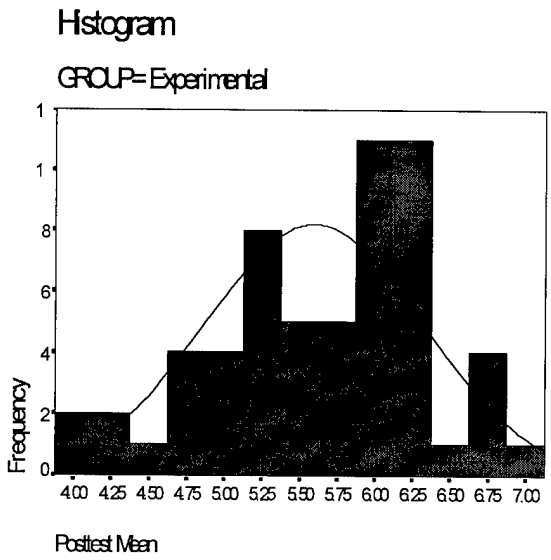
Figure 6.7. Experimental Group TDI Pretest Histogram



Mean = 5.41
Median = 5.50
Mode = 5.63

Mean<Median<Mode
Skew (-.877) - skewed left
Kurtosis (2.306) - more peaked

Figure 6.8 Experimental Group TDI Posttest Histogram



Mean = 5.60
Median = 5.75
Mode = 6.00

Mean<Median<Mode
Skew (-.511) - skewed left
Kurtosis (-0.247) - flatter

Table 6.7 contains the means and standard deviations of the measures used in this study for each instrument by pretest/posttest and control/experimental groups. This format allows for simple comparisons of the overall and individual question scores for each instrument and group. Also, because each of the data sets were mound-shaped, by using the mean and standard deviation, the data can be checked against the Empirical Rule.

The Empirical Rule states that approximately 68% of the observations will be within one standard deviation of the mean, 95% will lie within two standard deviations of the mean, and almost all will lie within three standard deviations. Table 6.8 shows the approximate percentages of observations from each data set that fall within one, two, and

three standard deviations from the mean. Each data set fell within the Empirical Rule approximations.

The mean scores are of particular interest because they show both the direction and amount of change from the pretest to the posttest. For the HMX-2, the computed pretest mean scores for both the control and experimental groups was 5.73. Posttest results showed a decline in test scores for the control group (5.69) and an increase in test score mean (5.85) for the experimental group. For the TDI, the computed pretest mean scores for the control and experimental groups was 5.32 and 5.41, respectively. Posttest results showed an increase in test scores for both the control group (5.34) and experimental group (5.85). At first glance, the experimental groups appear to have increased their scores while the control groups remained about the same from pretest to posttest. The significance of these differences in pretest and posttest scores will be tested in a later section.

Table 6.7. Means and Standard Deviations

Variable	Control Group		Experimental Group	
	Mean	SD	Mean	SD
HMX-2 Pretest (N=127)	5.73	.67	5.73	.59
Question 1	6.12	.66	5.98	.78
Question 2	5.75	.82	5.73	.89
Question 3	5.71	.85	5.78	.87
Question 4	5.78	.77	5.75	.76
Question 5	5.74	.87	5.68	.88
Question 6	5.53	.85	5.59	.70
Question 7	5.79	.94	5.71	.93
Question 8	5.60	.88	5.64	.89
Question 9	5.50	1.07	5.54	.97
Question 10	5.72	.94	5.76	.84
Question 11	5.78	.94	5.86	.75
Question 12	5.65	1.06	5.76	.73
Question 13	5.76	.95	5.68	.80
Question 14	5.78	.83	5.75	.76
HMX-2 Posttest (N=127)	5.69	.88	5.85	.67
Question 1	5.97	.95	5.95	.68
Question 2	5.82	.83	5.85	.81
Question 3	5.62	1.05	5.78	.93
Question 4	5.68	1.06	5.90	.86
Question 5	5.69	.98	5.85	.91
Question 6	5.60	.93	5.83	.75
Question 7	5.78	.90	5.76	.90
Question 8	5.59	1.00	5.75	.90
Question 9	5.38	1.16	5.71	.93
Question 10	5.65	1.12	5.85	.85
Question 11	5.85	1.01	5.95	.75
Question 12	5.68	1.03	5.85	.78
Question 13	5.60	1.25	5.88	.72
Question 14	5.71	1.05	5.95	.75

Table 6.7. Means and Standard Deviations (cont)

Variable	Control Group		Experimental Group	
	Mean	SD	Mean	SD
TDI Pretest (N=127)	5.32	.86	5.41	.61
Question 1	5.44	1.14	5.49	.88
Question 2	5.26	1.37	5.54	.79
Question 3	4.78	1.45	4.98	1.21
Question 4	5.18	1.22	5.32	1.11
Question 5	5.66	1.06	5.80	.78
Question 6	5.38	1.18	5.51	.84
Question 7	5.41	1.15	5.37	.87
Question 8	5.44	1.24	5.27	1.05
TDI Posttest (N=127)	5.34	.89	5.60	.72
Question 1	5.50	1.04	5.63	.81
Question 2	5.34	1.07	5.68	.80
Question 3	4.96	1.37	5.27	1.19
Question 4	5.26	1.06	5.58	1.04
Question 5	5.65	1.12	5.75	1.06
Question 6	5.54	1.26	5.76	.99
Question 7	5.19	1.27	5.54	1.06
Question 8	5.31	1.22	5.58	1.05

Table 6.8. Empirical Rule Comparisons

	HMX-2			TDI		
	One Standard Deviation	Two Standard Deviations	Three Standard Deviations	One Standard Deviation	Two Standard Deviations	Three Standard Deviations
Control Pretest	69.1%	95.6%	100.0%	75.0%	94.1%	100.0%
Control Posttest	75.0%	94.1%	97.1%	72.0%	94.1%	100.0%
Experimental Pretest	67.8%	94.9%	100.0%	81.3%	94.9%	98.3%
Experimental Posttest	69.5%	93.2%	100.0%	72.9%	94.9%	100.0%

Review of the Test Decision Rule

Now that the preliminary analysis of the data is complete, it is time to review the test decision rule. The use of the terms affect and does not affect in the hypotheses statements implies a two tailed test is used. The decision rule is then (Kenkel, 1996) :

If the Critcal Value $_{\text{Lower}} \leq$ Test Statistc $\leq$ Critical Value $_{\text{Upper}}$, choose H_0, otherwise choose H_1.

This decision rule states that if the test statistic falls between the lower and higher critical values (the acceptance region) the null hypothesis (H_{01} and/or H_{02}) is accepted. If the test statistic is outside the critical value range (the rejection region) the null hypothesis is rejected and the alternative hypothesis (H_{11} and/or H_{12}) is accepted.

When you use this decision rule for the Wilcoxon Matched-Pair Signed-Rank Test with large samples, the observed test statistic, $z = t_0 - \mu_T/\sigma_T$, is distributed approximately as a standard normal variable. If $z < -z_{\alpha/2}$, where α is the level of significance, reject the null hypothesis (Kenkel, 1996). For a significance level of $\alpha = 0.05$, $\alpha/2 = .025$, and the critical value of the test statistic is $-z_{.025} = -1.96$. For example, if z is less than -1.96, say -2.00, the null hypothesis will be rejected and the alternative hypothesis will be accepted.

Compute Test Statistics and Arrive at a Decision

The calculations in this section were computed using SPSS for Windows, however, one set will be done long hand to show the method and formulas of the Wilcoxon Matched-Pairs Signed-Rank Test. The formulas are as follows:

$z = t_0 - \mu_T/\sigma_T$ where t_0 equals either the sum of the positive (T_p) or negative (T_n) differences of all matched pairs, whichever is smaller. When the difference of a matched pair is zero (0), that pair is discarded and the sample size for calculations is reduced. The other two formulas needed are: $\mu_T = n(n+1)/4$ and $\sigma^2_T = n(n+1)(2n+1)/24$.

The example provided is done using the HMX-2 data. The hypothesis was stated as:

H_{01}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy does not affect team development as measured by the Horizontal Team Member Exchange II instrument.

H_{11}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy affects team development as measured by the Horizontal Team Member Exchange II instrument.

The first step is to determine if there was a significant change in team development for the control group. The first number to calculate is t_0. t_0 is either T_p or T_n, whichever is smaller. After calculating the differences of all matched pairs, $T_p = 859$ and $T_n = 911$, therefore, $t_0 = T_p = 859$. There were nine ties (9 times the difference was zero) reducing the useable group size to 59 (n = 68-9 = 59).

$\mu_T = n(n+1)/4 = 59(60)/4 = 885$

$\sigma^2_T = n(n+1)(2n+1)/24 = 59(60)(119)/24 = 17{,}552.5 \Rightarrow \sigma_T = 132.4858$

Plugging these into the formula

$z = (t_0 - \mu_T)/\sigma_T, \Rightarrow z = (859 - 885)/132.4858 = -.196 \Rightarrow -.20$

and following the decision rule of $z < -z_{\alpha/2,}$ and $-z_{.025} = -1.96$, the control group did not change significantly (-.20 is not less than -1.96). These same calculations are now done for the HMX-2 experimental group data. After calculating the differences, $T_p = 471$ and $T_n = 907$, so $t_0 = T_p = 471$. There were 7 ties so n is reduced from 59 to 52.

$$\mu_T = n(n+1)/4 = 52(53)/4 = 689$$

$$\sigma^2_T = n(n+1)(2n+1)/24 = 52(53)(105)/24 = 12057.5 \quad \Rightarrow \quad \sigma_T = 109.80664$$

Plugging these into the formula

$$z = (t_0 - \mu_T)/\sigma_T, \quad \Rightarrow \quad z = (471 - 689)/109.80664 = -1.99$$

and following the decision rule of $z < -z_{\alpha/2,}$ and $-z_{.025} = -1.96$, -1.99 is less than -1.96 so the experimental group changed significantly. Since a two-sided test is used, the next step is to determine the direction of the significant change (whether the training increased or decreased team development). This is done by referring back to Table 6.7 and comparing the means from the experimental groups pretest and posttest. The pretest mean was 5.73 and the posttest mean was 5.85. Therefore, the direction of change shows a positive increase in team development for the experimental group on the HMX-2 instrument. With no change for the control group and a significant change for the experimental group, the following can be said: the null hypothesis, H_{01}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy does not affect team development as measured by the Horizontal Team Member Exchange II instrument, is rejected, and the alternative hypothesis, H_{11}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy affects team development as measured by the Horizontal Team

Member Exchange II instrument, is accepted. The experiential training had a positive, significant impact on team development. These computations, as well as all computations concerning the TDI instrument, are presented in Table 6.9.

The following paragraph discusses the second hypothesis involving the TDI instrument. The null and alternative hypotheses are:

H_{02}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy does not affect team development as measured by the Team Development Inventory.

H_{12}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy affects team development as measured by the Team Development Inventory.

The control group data on the TDI resulted in a computed *z* score of -.47. This value does not show a statistically significant change between the control groups pretest and posttest because -.47 is not less than the required *z* score of -1.96 as stated in the decision rule. The experimental group data on the TDI resulted in a computed *z* score of -2.37. This value is less than -1.96, therefore, the experimental group realized a significant change in team development following the treatment as measured by the TDI. By referring back to Table 6.7, we can determine the direction of the change. The pretest mean score for the experimental group was 5.41 and their posttest score was 5.60. This shows that there was a positive change in team development. With no significant change for the control group and a significant change for the experimental group, we can reject the null hypothesis, H_{02}: Experiential education conducted on the Leadership Reaction Course at the United

States Air Force Academy does not affect team development as measured by the Team Development Inventory, and accept the alternative hypothesis, H_{12}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy affects team development as measured by the Team Development Inventory. Again, the results show that the experiential training had a positive, significant impact on team development.

The results of this study have shown that conducting experiential team building on a low ropes course significantly increases team development as measured by two separate instruments. There is less than a 5% probability that these results occurred by chance.

The results of this study are comparable with results obtained by other researchers. Priest and Lesperance (1994) reported significant increases in the overall TDI score for their experimental groups and no change in their control group. These are the same results as found in this study. Priest and Lesperance (1994) also conducted an analysis of their TDI data in another way, as did Bronson et al. (1992). Both studies analyzed each individual question for significant change with positive results. Bronson et al. (1992) did not report the overall score but we can assume that if there was a significant change for eight of the ten measures, the overall score change was also significant. Overall, the results of this study agree with past research efforts in that conducting experiential education positively affects team development.

A post hoc analysis of the data set was conducted to determine if the experiential team building had the same effect on both males and females. The results were mixed and warrant mentioning. Table 6.10 shows the computed z scores and P-values from the HMX-2 and TDI instruments that correspond to both males and females. As expected, the control groups for both the males and females showed no significant change. However, the experimental group data produced some interesting results. Regarding the HMX-2 instrument, males showed a significant change in the positive direction (z = -2.03) whereas females had a z = -.28, reflecting an insignificant increase in mean score of only .03 as compared to the male increase of .13. Regarding the TDI instrument, both males and females showed a positive increase in team development, however, as compared to the males, females showed a much greater increase in team development. The female z equaled -2.53, a significant increase whereas the males z equaled -1.56. The males increase was large but not statistically significant at the $\alpha = .05$ level.

Reports of previous studies did not include gender analysis so there is nothing available at this time to compare this post hoc analysis to. However, these mixed results of male and female reaction to training based on the instrument used requires further discussion and will be covered in Chapter 7, Conclusions and Recommendations. The complete data sets are included in Appendices G and H for the HMX-2 and TDI instruments, respectively.

Table 6.9. Wilcoxon Test Results

				N	Mean Rank	Sum of Ranks
HMX-2	Control Group	Ranks	Negative Ranks	29	31.41	911.00
			Positive Ranks	30	28.63	859.00
			Ties	9		
			Total	68		
		Test Statistic	*z*	-.196		
			P-value	.844		
	Experimental Group	Ranks	Negative Ranks	33	27.48	907.00
			Positive Ranks	19	24.79	471.00
			Ties	7		
			Total	59		
		Test Statistic	*z*	-1.988		
			P-value	.047		
TDI	Control Group	Ranks	Negative Ranks	31	31.56	978.50
			Positive Ranks	29	29.36	851.50
			Ties	8		
			Total	68		
		Test Statistic	*z*	-.468		
			P-value	.640		
	Experimental Group	Ranks	Negative Ranks	37	25.65	949.00
			Positive Ranks	15	28.60	429.00
			Ties	7		
			Total	59		
		Test Statistic	*z*	-2.373		
			P-value	.018		

Table 6.10. Wilcoxon Test Results by Gender

			Males	Females
HMX-2	Control Group	z	-.382	-.356
	Test Statistic	P-value	.703	.722
	Experimental Group	z	-2.034	-.281
	Test Statistic	P-value	.042	.779
TDI	Control Group	z	-.432	-.236
	Test Statistic	P-value	.666	.814
	Experimental Group	z	-1.555	-2.530
	Test Statistic	P-value	.120	.011

CHAPTER VII

CONCLUSIONS AND RECOMMENDATIONS

This chapter summarizes the analysis, synthesis, validation, and results. After this brief review, the conclusions of this research effort are presented. Following the conclusions reached, three areas will be discussed. The first area involves future research recommendations. The second area discusses my academic goals for this work. The final area provides a brief synopsis of how I will personally use this research.

The analysis conducted in Chapter 3 identified interpersonal relationships as a common theme throughout all team development models reviewed. This showed us interaction and teamwork are important for developing teams. The team building analysis identified that a low ropes course intervention using the problem-solving approach can be used to enhance the quality of team member interactions and the display of effective team characteristics. This may not be an original idea, but the literature review and analysis are a prerequisite for knowing how to develop teams.

The team development and team building analyses were synthesized and the process for conducting team building was developed in Chapter 4, Synthesis. The Leadership Reaction Course (a low ropes course that employs the problem-solving approach) was selected as the place to implement a team development training curriculum. The curriculum involved 3 hours of intense experiential training with each

group completing 6 to 9 activities. Following the description of the course, curriculum, and training schedule, the HMX-2 and TDI instruments were developed. The TDI has been used in several studies. The HMX-2 was designed specifically for this research effort by Nason and I. Both instruments were based on prominent team development models that accurately measured the team development characteristics of interest. The synthesis of Chapter 2 and 3 provided both the process and the tools to measure the effect low ropes course training had on team development.

Chapter 5, Validation, provided a logical sequence of considerations to test the previous chapter's synthesis. By identifying the research, design, and analysis considerations, the experimental design allowed for statistical analysis of the hypotheses:

H_{01}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy does not affect team development as measured by the Horizontal Team Member Exchange II instrument.

H_{11}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy affects team development as measured by the Horizontal Team Member Exchange II instrument.

H_{02}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy does not affect team development as measured by the Team Development Inventory.

H_{12}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy affects team development as measured by the Team Development Inventory.

These hypotheses tested whether or not the experiential team building conducted on the Leadership Reaction Course had an affect on the student groups.

In Chapter 6, Results, the Wilcoxon Matched Pairs Signed Ranks Test showed that the experiential team building conducted on the LRC not only affected team development but had a significant positive affect on team development at the $\alpha = .05$ level as measured by both the HMX-2 and TDI instruments. In reviewing the results, both null hypotheses were rejected. Concerning the HMX-2 data set, the control group did not change from pretest to posttest, as expected. The experimental group, however, realized a significant, positive change in team development. These results validated the current curriculum used in BS 310 for the Spring semester students as measured by the HMX-2 and allowed the null hypothesis, H_{01}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy does not affect team development as measured by the Horizontal Team Member Exchange II instrument, to be rejected and the alternative hypothesis, H_{11}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy affects team development as measured by the Horizontal Team Member Exchange II instrument, to be accepted.

Concerning the TDI data set, the control group also did not change from pretest to posttest. The experimental group, however, also realized a significant, positive change in team development. These results again validated the current curriculum used in BS 310 for the Spring semester students as measured by the TDI and allowed the null hypothesis, H_{02}: Experiential education conducted on the Leadership Reaction Course at the United

States Air Force Academy does not affect team development as measured by the Team Development Inventory, to be rejected and the alternative hypothesis, H_{12}: Experiential education conducted on the Leadership Reaction Course at the United States Air Force Academy affects team development as measured by the Team Development Inventory, to be accepted.

These results are exciting for several reasons. First, this study overcame the eight identified barriers (Priest et al., 1993) to conducting research on experiential education. Second, it adds to the tiers of knowledge (Priest et al., 1993). Third, and most important of all, the results were gained from a single three hour training session as compared to much longer interventions mentioned in Chapter 2. Bronson et al. (1992) used a three day intervention. Priest and Lesperance (1994) used a 48 hour intervention. Priest (1996) conducted five one-day training sessions spread over 5 weeks. Each of these interventions positively and significantly affected team development, however, they took a lot more time to accomplish. In today's competitive business environment, it is much more conducive to accomplish your team development objectives in a three hour training block than letting your employees attend a three to five day workshop.

The following pages cover three general areas that this research effort will impact: future research considerations, academic uses for this effort, and how I plan to personally use this work.

The first area of interest concerns future research efforts at USAFA. This study provides a research foundation for USAFA's experiential learning programs. It is, however, just a beginning. Based on the findings of this research, many more questions

need to be asked and answered. The first question would be, is there a difference in LRC use for the Fall semester BS 310 students versus the Spring semester students. As previously mentioned, the Spring semester students receive the LRC training as a capstone activity for the BS 310 course. The use is different in the fall. Primarily because of weather constraints, the LRC training is conducted within the first two weeks of the semester. Rather than a capstone activity to practice the classroom lessons learned, the LRC is used to bring the classmates closer together, developing their groups. As the class progresses through the semester, the LRC experience is reflected upon. These two different uses provide a great opportunity for a study. Which semester gains more from the experiential learning experience, the Fall semester students without the classroom instruction or the Spring semester students after receiving the classroom instruction? Besides for determining which group gains the most, insight could also be gained on the effectiveness of training at different team and leadership knowledge levels. If the Spring semester students realized significantly more team development increases, it may be smart to provide some leadership and teamwork lessons prior to conducting experiential team building for all like groups. Also, the LRC use is conducive to intact groups. If the Fall semester students faired better, it may show that this use of the LRC is more conducive to newly formed teams.

Another logical extension of this research would be to test the effectiveness of the LRC training during Basic Cadet Training, using the same instruments. The student population is drastically different (new recruits) and the facilitators are upper class cadets (versus instructors from the Department of Behavioral Sciences and Leadership). This

could provide several different analyses. First, do the new recruits respond to the training as the BS 310 students did? Second, does the current LRC training during BCT actually accomplish the established objectives (the objectives are not the same as in BS 310 yet the curriculum is very similar)? Third, are the cadet facilitators during BCT doing an adequate job or do they need additional facilitator training? Should BS 310 instructors provide the facilitation? One way to test this would be to train some new recruits with cadet facilitators and some with Behavioral Science instructors and test if both groups experience the same amount of team development increases? Are the objectives for the new recruits met with either or both sets of facilitators? These ideas may provide insight to both how training is conducted and who should be doing it.

Another area to consider concerns non-cadet use of the LRC. Many foreign military groups visit and receive training at the LRC. What do they get out of it? The LRC is also used as part of the Lieutenants Professional Development Program. Is their experience similar to the results found in this study? The LRC is a wonderful facility for team training. With continued research, further insight may be gained for more effective and efficient use.

The final area concerns the LRC use as well as other experiential training programs. It concerns this studies post hoc analysis by gender. There was a measured difference in reaction to the experiential training for males and females. The HMX-2 data set analysis showed that males significantly increased their team development, whereas females did not significantly change. The HMX-2 instrument relies heavily on the

individuals perceived relationship level. Do females perceive relationships that much differently? I think they do and strongly recommend this area for further research. The test results showed that the pretest mean score for males was 5.70 versus 5.92 for females. After the training, the males score increased to 5.83 whereas the females scores increased by only .03 to 5.95. I believe this difference must be attributed to perceived relationship levels and not to female versus male reaction to experiential team training. I say this with confidence because the TDI data analysis showed a different scenario. Both the males and females showed positive increases in team development. The experimental group females showed a significant positive increase in team development ($P = 0.01$) with their mean score increasing from pretest (5.17) to posttest (5.74). Their measured gain was substantially more than the males. Although the males showed a positive increase in team development ($P = 0.12$), it was not significant at the $\alpha = .05$ level. Their pretest score was 5.46 versus their posttest score of 5.57.

Following these initial studies, the methodology in this study could be used to test the effect USAFA's high ropes courses have on team development. Most of the literature reviewed in Chapter 2 recommended using low ropes courses for team development. Do the high ropes course curriculums have an equal or greater impact on team development? Or, do high ropes courses affect personal development instead, as the current literature suggests? USAFA's high ropes courses are currently being used for both team and personal development. Anecdotal evidence tells us it is helping teams develop, however, no quantitative measurements and analysis have been conducted.

Other areas to consider involve other ongoing programs at USAFA. All of them are action-oriented and may potentially enhance team member interaction and the display of effective team characteristics. These include, but are not limited to, the Combat Survival Training program, parachuting program, glider program, athletic teams, club affiliations, and the Cadet Wing military structure in general. With so many potential programs to evaluate, care must be taken. Although it would seem ideal to measure the impact of each of these programs as soon as possible, I do not recommend it. Cadets are already surveyed and tested beyond their saturation level. There needs to be a logical, sequential plan developed that gradually encompasses the many research opportunities.

Through increased research on current programs, we may be able to determine what type of training activity to use, when to use it, how long to use it, and when we need to use it again to achieve the desired learning objectives. To gain a more in-depth understanding of the process, all researchers need to share and fully disclose their research efforts. This leads me to the next use of this work, academic purposes. This dissertation will be made available to the dissertation services (i.e. UMI) so others can review my approach and improve on the various areas. Also, I have included every applicable aspect of this study in the dissertation, including course objectives, curriculum, facilities, and facilitators. This provides the full disclosure several authors have recommended so other researchers can build on my work. I believe this is paramount. Beyond this, I plan on submitting parts of this dissertation to various sources for publication. The first part is from Chapter 2. The review of the group and team development models provides a thorough synopsis of the work done to date. The team

development and team building analysis, from Chapter 3, will also be submitted as it provides a snapshot of how team development and team building work together. The final area that will be sent to several journals (i.e. Training and Development Journal, Journal for Experiential Education) includes the methodology and results sections.

The last area discusses how I plan to personally use this research. Overall, the best part has already happened. By accomplishing this dissertation, I have learned a tremendous amount about team development, teams, team building, experiential learning, research methods, instrument design, experimental design, modeling, and statistics. These lessons will stay with me forever. I will soon put them to practice in the Air Force. As mentioned earlier, the Air Force relies on teams to accomplish its mission. With my increased awareness of effective team characteristics and how they can be enhanced, I will look for ways to assess and improve both intact and newly formed teams around me. Cadet groups tend to receive most of the training, however, I feel there is a great need for this training throughout the Air Force and will try to provide this opportunity to all. The second personal use involves my business plan. By conducting this research, I can now confidently complete my consulting business plan. Besides for the common executive summary, vision and mission statements, marketing plan, financial plan, facilities plan, and personnel plan, the product and service section is quite extensive and involves assessment and training for corporations in team development, leadership, and human relations.

The following briefly discusses my own views of how the experiential learning methodology should be used. First, a thorough needs assessment must be conducted to

determine the specific goals and objectives of the training. This assessment must accurately reflect what the customer wants, needs, and expects from the training. This will require quite a bit of up-front time with the clients but is completely necessary. Before any training begins, measurements must be taken on the areas of interest (i.e. team development using the HMX-2 and/or TDI). Without measurement, not only do you never know your impact, but you cannot improve on the training or add to the body of knowledge. Based on the needs assessment, a custom curriculum should be developed to meet the customers' needs. I do not believe any one method or curriculum of experiential learning is appropriate for all groups. Concerning team development, I see a mix of both high and low ropes training being more effective. I feel this way for the following reasons. The Team Compilation Model (Kozlowski et al., 1997) theorizes that teams compile over *levels* and *time*. To me this makes sense and can be planned for in the training curriculum. As teams progress through *levels* (individual, dyadic, and team) over *time*, based on where the team is, the appropriate experiential learning methodology can be used. For example, if the team is at the *individual* or *dyadic* level, high ropes course training may be most appropriate. High ropes courses are known to focus on personal and individual development. Also, because these courses typically involve two or three people working together (i.e. climber and belayer), dyads may also be strengthened. As the group moves further through the continuum towards the team level, low ropes training may then be warranted. With a good needs assessment tool, I will know what type of training to use.

Beyond the needs assessment and custom curriculum, the next area to concentrate on is close contact and follow-up with the customer. I do not think the methodology is magical, it is a means to an end. The benefits gained can only last so long. With close monitoring and continued training, I think the teams will greatly benefit from the experience. If a group wants a one shot cure-all or tell me they are not interested in being evaluated before and after the training, I would tell them to find someone else. There are already enough companies practicing the methodology and giving it a bad reputation.

The final area of emphasis concerns facilitators. Facilitators are the most important part of the process. In this study, the facilitators were exceptional. They had both facilitator training and the proper educational background to ensure the training objectives were met.

All too often, a "cookie-cutter" approach is taken to experiential training. I have seen and experienced great facilitation, but far too many times the facilitators are not qualified to conduct the type of training requested or needed. This is a problem for both facilitators and course managers and directors. They are not very thorough at screening both the groups that need the training or the facilitators providing it. This may be caused by profit motive and/or ignorance. Either way, it is not productive. For example, a soccer team wanted to acclimate their new recruits to the teams culture and provide the new recruits an opportunity to get to know the team leadership and expectations. The course managers selected the first two facilitators available from a list to provide the training. One of the facilitators had never participated in sports and did not know the least bit about soccer. During the debriefs, this facilitator was unable to transfer the

experience to the field. He actually tried to and played the part of the fool. Fortunately, the second facilitator had a sport and soccer background and was able to make the necessary transfer. This may seem a minor point, it is not. Without the transfer from training back to the field, the team may as well of had a picnic. It was definitely a hit or miss situation because the course director never considered the groups needs and one facilitator tried to fake it. Another example of poor facilitator selection involves one of the largest providers of experiential training in America. The company was hired to train a military human relations department on how to use experiential training methods to improve the social climate. The facilitators that provided the training were useless. Their knowledge of the experiential learning process and human relations issues did not exceed the script they were provided by the company's curriculum writers. Additionally, they had no knowledge or background on how the military conducts its day-to-day affairs. These facilitators were put in a bad situation. However, rather than admitting their shortcomings, they pressed on and floundered.

I could probably go on forever about the poor facilitation and management I have either observed or experienced. I will not. The point is, conduct a needs assessment, design a curriculum, have the right people facilitate the training, measure the effects, and follow-up. These are important aspects that need to be done to both truly help your customer and provide more insight into the experiential learning process.

When the experiential learning process is properly practiced, it can be effectively used to make our organizations more competitive, efficient, and effective, all with a happier work force. This may be a stretch, but if employed by responsible practitioners,

experiential learning may have a greater impact than any other organizational tool or management style to date.

APPENDICES

APPENDIX A

FACILITATOR GUIDANCE

FACILITATOR GUIDANCE

Integration of BS 310 Topics

Obstacle #1 - Communication/Feedback/Assertiveness/Listening
This station sets up station 12: sending someone all the way over and return to share the big picture. Sending an advance team - did the leader appoint a commander or the advance team? Plan a way to communicate? Tell the team whether or not they're supposed to come back?

Obstacle #2 - Functional Fixedness/Creativity
What role does trust play? Time to complete vs. Delicate material to handle. What's the optimal size of a group? Examples of process loss? Social loafing? If someone doesn't understand, will a demo help?

Obstacle #3 - Resource allocation/Influence tactics

Obstacle #5 - Trust/Communication/Creativity

Obstacle #8 - Total Quality/Functional Fixedness/Brainstorming/Attention to detail
Going "through" a fence vs. Over it. How did you feel when your idea wasn't used? Indicators that someone doesn't understand the plan? Implications for "owning" and correcting errors vs. passing on poor quality work?

Obstacle #12 - Delegation

Questions Which May Apply to Any Obstacle

1. Leader's behavior, style, and emergence (if not appointed). How and why selected?
2. Emergence of an informal leader? How and why?
3. Making/adjusting a plan - brainstorming - did everyone get involved? Why/why not?
4. Delegation of roles - use of expertise - allocation of resources and people skills.
5. adherence to the rules? If not, why?
6. Time keeping and effective use of time.
7. Interpersonal relationships and conflicts. If any, how resolved?
8. Group's behavior - active vs. Passive, effective followers? Did they understand task?
9. Barriers or problems encountered. How solved? Was the plan/leader/group flexible?
10. Communication patterns. Feedback? Vertical? Horizontal? Whose responsibility?
11. Standards/Discipline/Spirit/Praise/Criticism/Motivation/Cohesion - How were they?
12. Equality of participation - did anyone feel left out of the process? Why?
13. Did you know each other's names? How did this impact communication and group dynamics?

14. Optimal size of a group? Examples of process loss?
15. What did you do about members who did not understand what was going on? Ignore? Repeat? Give a demo? Criticize? Was your reaction to them effective?

Wrap-Up Questions

1. What about this experience can be related to the real world? Cadet Wing? Real Air Force?
2. If you could describe your experience in one word, what would it be and why?
3. Think of the best team you've ever been on. On a scale of 1 to 10, how does the performance of your team today rate against that team? (Ten being the best score)
4. Did your team effectively use the 80/20 rule? Specifically, did you spend 80% of your time debriefing things you did wrong or did you concentrate only on those areas where you performed well?
5. What actions helped or hindered your group? What will you do differently next time?
6. What is the most important thing you learned about yourself today?

APPENDIX B

AFTERNOON TRAINING SCHEDULE

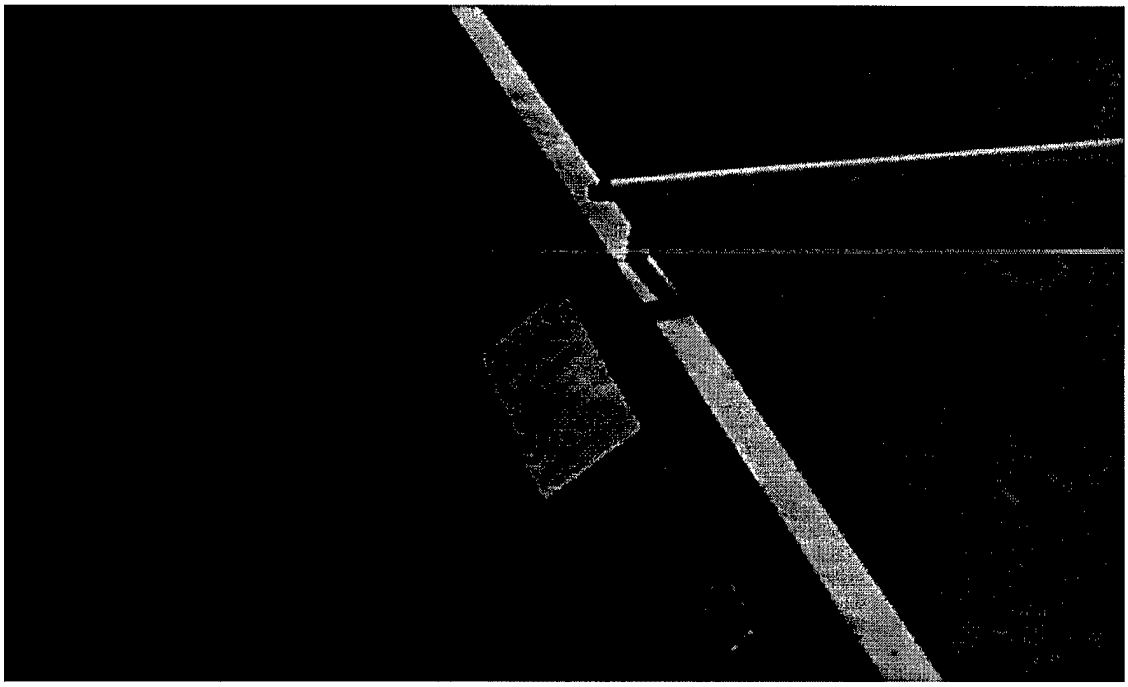
AFTERNOON TRAINING SCHEDULE

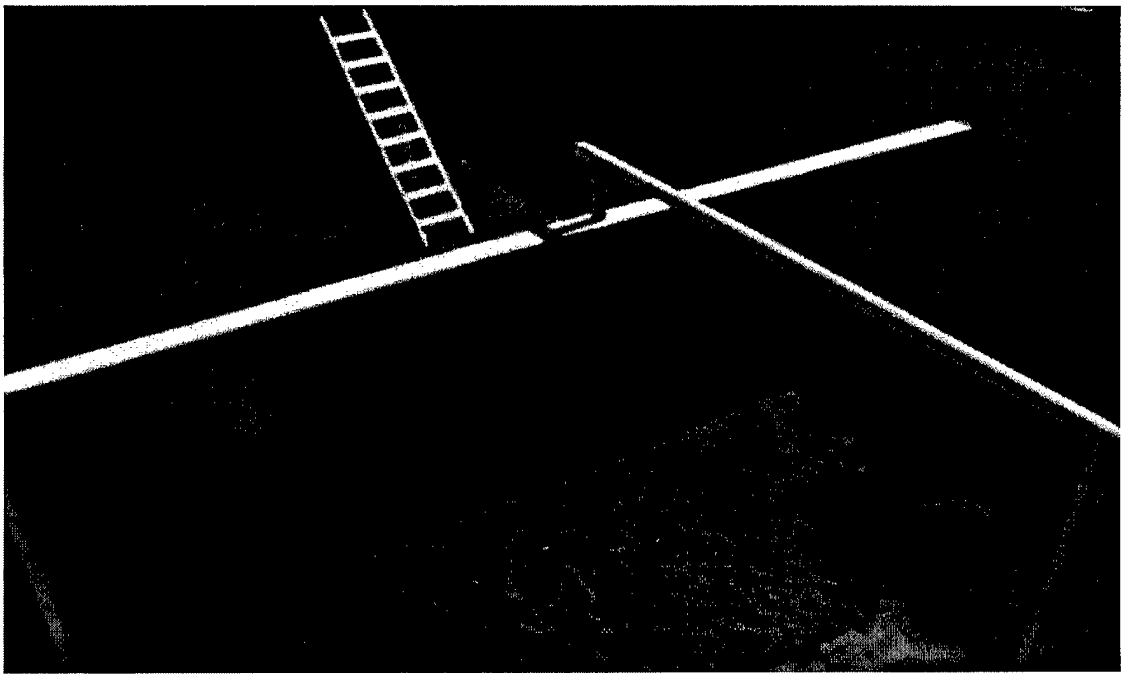
Time	Activity
1300-1310	Introduction and safety briefing
1315-1330	First station
1330-1340	Debrief, rotation to next station
1340-1355	Second station
1355-1405	Debrief, rotation to next station
1405-1420	Third station
1420-1430	Debrief, rotation to next station
1430-1445	Fourth station
1445-1455	Debrief, rotation to next station
1455-1510	Fifth station
1510-1520	Debrief, rotation to next station
1520-1535	Sixth station
1535-1545	Debrief
1545-1600	Wrap up

APPENDIX C

LEADERSHIP REACTION COURSE STATIONS

Station 1 - Out Like Flint





Number of Team Members: 7

Equipment:

Type	Number	Dimensions
Rope	2	20 feet
Rope	1	7 feet
Rope	3	4 feet

Any other equipment found

Set-up:

a. Place ladder on SW side of wall near concrete pad.
b. Stretch 20' rope across sand to NE wall.
c. Place other ropes by NE wall.

Task:

You are being held hostage while on a humanitarian aid mission in Somalia. The cell where they are holding you will soon be overrun by friendly forces. The enemy is getting ready to move you. If you can escape now you can probably hide until your own forces reach this area. You know the guards will come for you any minute. Speed is important. An old man, apparently an ally, has thrown one end of rope into the compound. The other end of this rope is tied to the wall at the far side of the water area. You don't know whether this is a trap to dispose of you or not. There is a possibility, if he were friendly, that other equipment is stashed on the far side of the water area. The walls are wired and anyone touching a red area will set off an alarm in the guard command post. The water is also armed to set off an alarm if any object disturbs the surface. You also know that if you reach the far side, the enemy's command post is so close that verbal communication between the wall and the compound and vice versa will be impossible. You have secured the equipment you see here. You must work quickly.

Safety:

a. Spot from land side of the wall, making sure you break anyone's fall from the wall or pipe.
b. Make sure the ladder is in a solid position before it is used for anything.
c. Do not tell anyone about the ladder. Let the team discover it without outside help.

Fouls and Penalties:

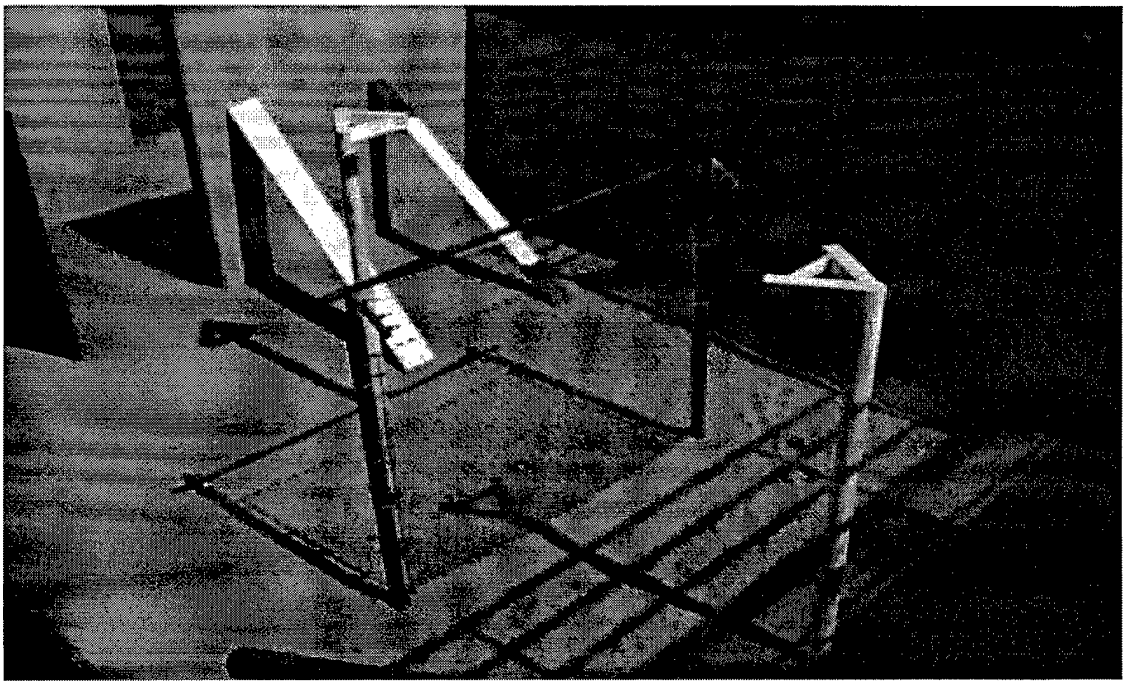
a. Ladder touching red area or water - 60 sec and reposition ladder.

b. Talking between wall and compound or vice versa - 30 sec.
c. Touching red area or water - 30 sec and that person starts over.
d. Equipment other than ladder touching red area or water - 30 sec.
e. Help from non participant or catwalk - 60 sec first offense, add 30 sec for each additional violation (i.e. 90 sec for second violation).

Solution:

Step 1 - Team should pull long rope straight while 1 or 2 members go across to wall then return to get a plan
Step 2 - Team members should cross in the same way as in step 1.
Step 3 - Team members on wall should pull the pole out of the tube.
Step 4 - Team members on the wall should slide the ladder across the pole to other members.
Step 5 - One member should slide out on the pole and tie the top rung of the ladder to the pole with the small rope.
Step 6 - All members should move up the ladder, across the pole, and jump to the sand on the other side.

Station 2 - Demolition Man



Number of Team Members: 7

Equipment:

Type	Number	Dimensions
Plank	1	10 feet
Plank	1	3 feet
Rope	1	14 feet
Charges	4	20 lbs

Set-up:

Place all equipment on W wall.

Task:

You are members of a sabotage team. All members must cross this fence which encloses a power plant, set the explosives, and return. The explosive is volatile and must be handled very carefully. The area between the high voltage warning posts and fence is mined. The lower red portion of the signposts and fence are electrified. Touching any

part of them sets off a silent alarm. A guard patrols this portion of fence every 15 minutes. He has just passed. Begin work.

Safety:

a. Insure that plank is firmly and securely placed any time someone climbs on it.
b. Do not stand on top of the signposts.
c. Do not walk across plank (crawl or slide only).

Fouls and Penalties:

a. Rough handling the explosives - 60 sec and forward team member returns to the start.
b. Anybody or any equipment touches the ground between the signposts and the fence, or touches the fence or lower portion of the signposts - 60 sec.

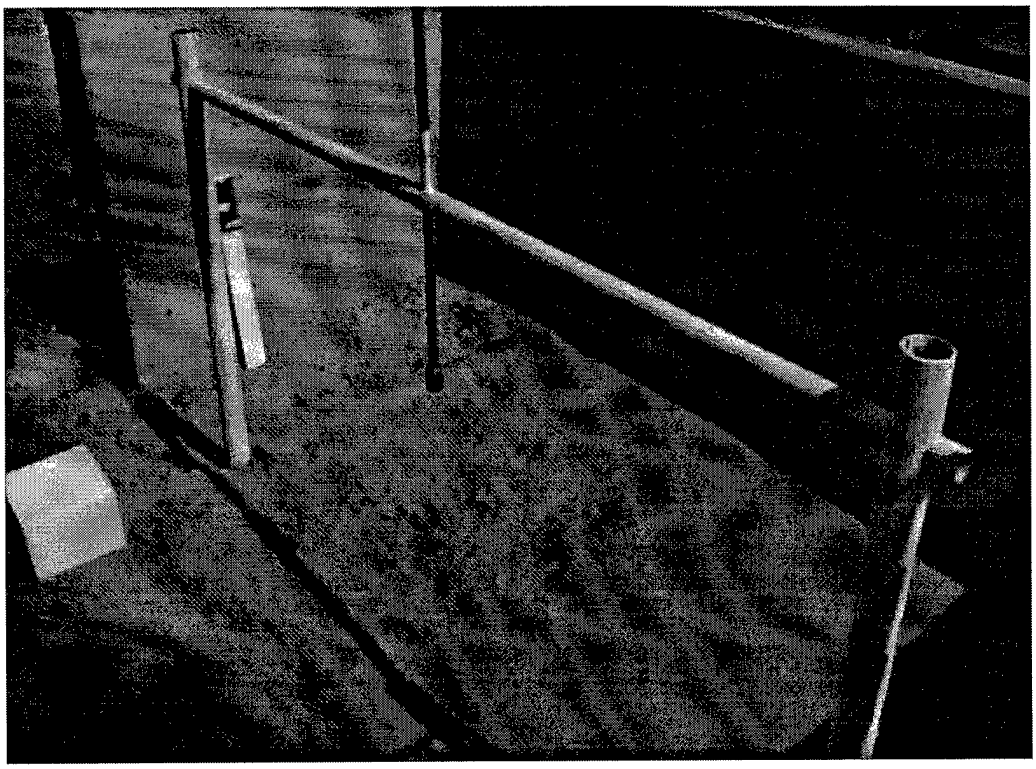
Solution:

Step 1 - Team members should use the rope provided to lash together the small board to the large board.
Step 2 - The strongest team member should go to the top of the pole while the other team members help him/her lay the boards across to the other pole.

*The boards should fit into the indentations on the poles.
*Monitor should ensure that the boards are put together safely before anyone crosses.
*The little board should be underneath or boards will sag and hit the red fence.

Step 3 - All members should cross to the other side of the sand by crawling over the boards with the sand bags.
Step 4 - All members should cross back over the boards to the side of the fence in which they started after all members have crossed over once and the sand bags have been left on the other side of the pole/fence.

Station 3 - Ho Chi Minh Trail



Number of Team Members: 9

Equipment:

Type	Number	Dimensions
Rope	1	7 feet
Rope	1	15 feet
Box	1	About 10 lbs
Plank	1	2" x 4" x 6'

Set-up:

a. Place box directly underneath center perpendicular pole.
b. Place all other equipment on W wall.

Task:

Your team has parachuted behind enemy lines. The mission tools tore loose during the jump and landed in the road. You cannot continue your mission without these tools. You cannot touch the road with any object because of the antipersonnel mines used by the

enemy. This old gate offers help. However, the red areas have been booby-trapped and will set off a detonation at the slightest touch. You have several ropes. You cannot stay here long because the enemy may have seen you drop. The whole team must cross this road in order to reach your objective.

Safety:

a. If people sit on the bar to cross, spotters should follow them across.
b. Spotters should be underneath anyone crossing the bar at all times.

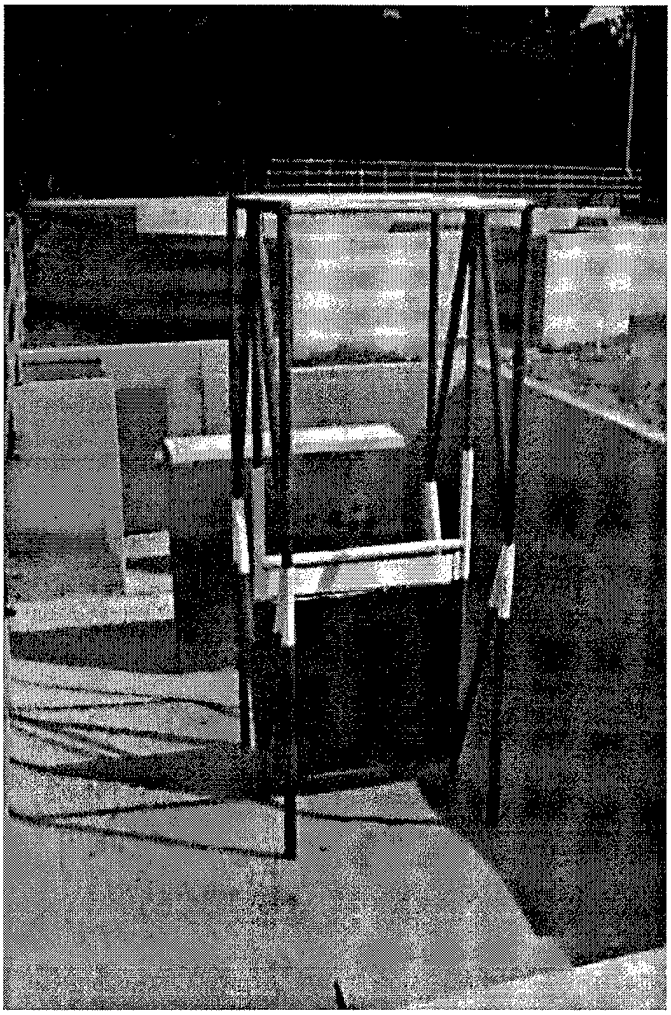
Fouls and Penalties:

a. Team members or equipment touching a red area or the ground between the posts (entire team starts again).
b. Help from non participants or catwalk (60 sec for first offense and add 30 sec for each additional violation, i.e., second violation would get 90 sec penalty).

Solution:

Step 1 - Tallest team member should be the last to cross.
Step 2 - All team members should move hand over hand across the top bar, jump down on the box, then continue to the other side of the sand.
Step 3 - Last team member should cross to the box with a rope, loop the rope over the bar, tilt the box with his/her feet, and carefully jump to the sand where the box had been sitting.
Step 4 - Last team member should then pick the box up and throw it to his/her teammates on the other side of the sand.
Step 5 - Last team member should then cross the bar to join his/her teammates on the other side of the sand.

Station 4 - Wall Banger



Number of Team Members: 6

Equipment:

Type	Number	Dimensions
Rope	1	20 feet
Block	1	6" x 12" (notched)

Set-up:

Coil rope and place on concrete pad with block on top.

Task:

There are two main obstacles which are located six and twelve feet, respectively, from the starting line. This platform is the starting position and you cannot touch the ground around the platform. Your task is to move your entire team from this starting point, over the obstacles, to the area beyond the second obstacle. Any part of the bombed out bridge which is painted white is strong enough to support your weight. You cannot touch the ground or any area painted red. Carefully observe the off-limits areas and use extreme caution. Work as quickly as you can.

Safety:

a. Spotters should remain under anyone on the tower. In general, there should be at least one spotter on each side of the wall.
b. Person at the top of the platform must have his/her legs locked at all times.

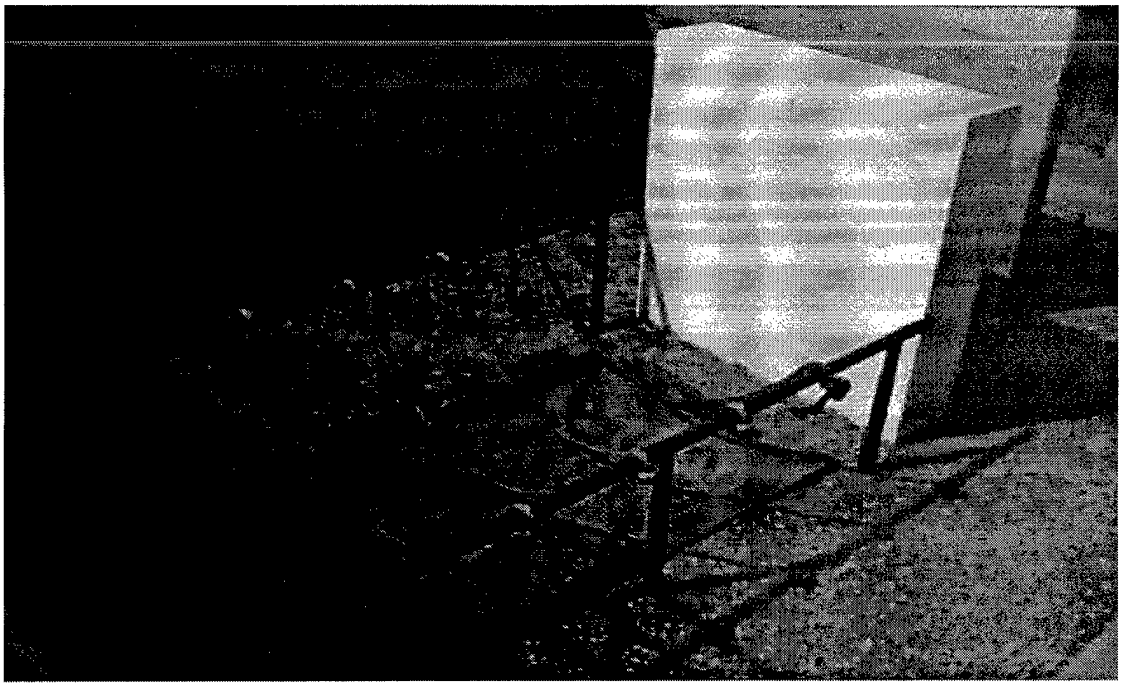
Fouls and Penalties:

a. Team member touching ground or any area painted red - 30 sec and member starts again.
b. Help from non participants or catwalk (60 sec for first offense and add 30 sec for each additional violation, i.e., second violation would get 90 sec penalty).
c. If block is lost during problem, it remains lost.
d. If rope is lost, 90 sec penalty and start problem again. Return all equipment if problem started again.

Solution:

Step 1 - Tie the block to the rope and throw it over the first bar so a person is able to climb to the very top and sit on a white bar.
Step 2 - The person on the top should wedge the block between two bars allowing the rest to swing to the middle, putting their feet on the white bars near the top.
Step 3 - Swing the rope on the other side of the second top bar so members can swing to the top of the second obstacle.
Step 4 - Once everyone is over the wall they should hold the rope so the person at the top can climb down to the top of the second obstacle and jump over.

Station 5 - Bosnian Rope Bridge



Number of Team Members: 7

Equipment:

Type	Number	Dimensions
Plank	2	2" x 12" x 4'
Box	1	About 20 lbs.

Set-up:

Place plank and box at beginning of event inside the red rails.

Task:

A portion of a makeshift bridge collapsed behind you. You are trapped in this small area. You must continue your mission, for the enemy is all around you and may discover your presence at any moment. The bridge was originally destroyed with a nuclear weapon and all red areas are still radioactive and cannot be touched by anything. The box you have is serum which is vitally needed by your unit. Any rough handling of the box might break the serum bottles inside. Therefore, extreme caution should be used in transporting the container. The water is swift and any objects falling into the water

will be swept away. Your entire team must cross this rope bridge, scale the cliff at the far end, and deliver the serum to your unit located beyond the cliff. The area of ground between the cliff and the bridge is mined and cannot be touched.

Safety:

a. One spotter should follow each person across the ropes, spotting for the person's head if he/she falls toward the bars or cement.
b. Two spotters should be placed near the wall to spot people going from the ropes to the wall.

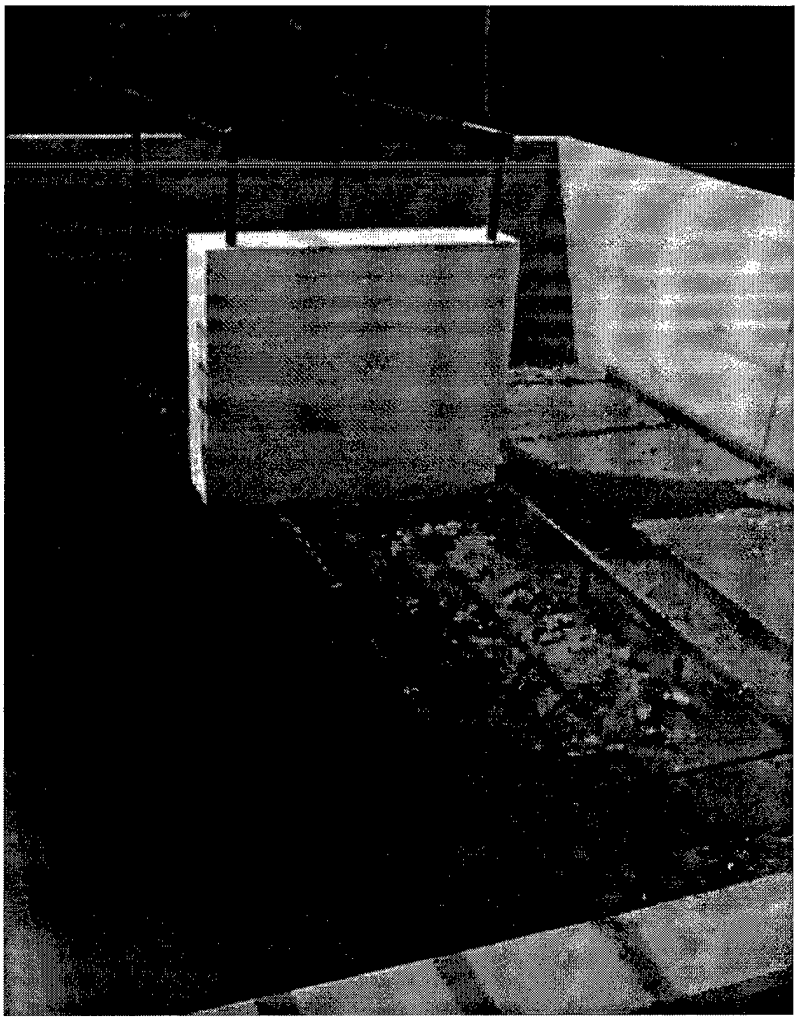
Fouls and Penalties:

a. People or equipment touching red area - 60 sec and person/equipment starts over.
b. Person falls into water - 60 sec and person starts over.
c. Box falls into water or dropped - 60 sec and entire team starts over.
d. Person or equipment touches mined area - 60 sec and entire team starts over.
e. Rough handling of box - 30 sec.
f. Plank falls into water - loss of plank.
g. Help from non participants or catwalk (60 sec for first offense and add 30 sec for each additional violation, i.e., second violation would get 90 sec penalty).

Solution:

Step 1 - Lay the first board over the first couple of ropes. Someone with good balance should do this.
Step 2 - Have that person lay down the second board so as to continue crossing to the wall. Someone behind him/her should stabilize the second board as he/she jumps to the top of the wall.
Step 3 - All members should cross with the person on the wall helping others over.

Station 6 - Ground Zero



Number of Team Members: 6

Equipment:

Type	Number	Dimensions
Plank	1	2" x 8" x10'
Rope	1	6 feet

Set-up:

Place all equipment at starting point, in front of the red structure.

Task:

You have been dropped behind enemy lines to destroy the enemy's nuclear power plant. You have completed you task of planting the explosives and have set them to go off in fifteen minutes. You are met by an ally and have now come to the enemy's defense line. You must get past this obstacle, crossing a raging stream, and meet the team of special forces who will take you to safety. All equipment you use must be taken with you. Everything painted red and all wire screens are mined and must not be touched. Remember, you have just fifteen minutes before your explosives will go off. You must leave here immediately.

Safety:

a. When people are climbing on the wall, spotters should insure that the person doesn't fall back onto the wire obstacle.
b. Insure that no jumping occurs from the plank to the other side of the water.

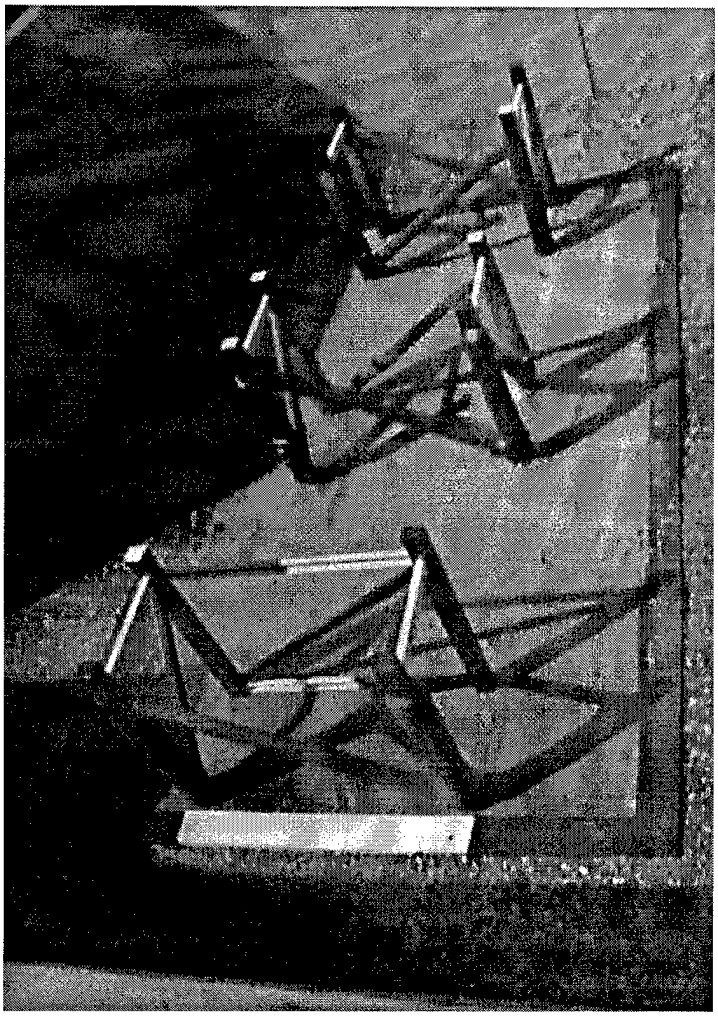
Fouls and Penalties:

a. Person or equipment touching red area or screen - 30 sec.
b. Rope falling into water - loss of rope.
c. Loss of control of board causing it to fall into water or onto ground - 30 sec and board starts over.
d. Person touching or falling into water - 30 sec and person starts over.
e. Board touching water - 30 sec and reposition board.
f. Help from non participants or catwalk (60 sec for first offense and add 30 sec for each additional violation, i.e., second violation would get 90 sec penalty).

Solution:

Step 1 - Have someone dig a tunnel on just one side under the cage. Make sure everyone can fit under the cage.
Step 2 - Everyone should pass through the tunnel to the other side. Bring the board with you.
Step 3 - Once everyone has climbed to the top of the wall, use the board to slide down past the sand.

Station 7 - Medivac



Number of Team Members: 7

Equipment:

Type	Number	Dimensions
Dummy	1	About 145 lbs.
Stretcher	1	Normal
Plank	1	2" x 6" x 76"
Plank	1	2" x 6" x 62"
Plank	1	2" x 6" x 52"

Set-up:

Place all equipment at the beginning of the obstacle.

Task:

These pilings represent the remains of a bridge which has been blown up by enemy nuclear weapons. Portions of the pilings and the water have been contaminated and cannot be touched. You are the crew of a Jolly Green Giant rescue helicopter shot down in enemy territory. One crew member has been critically wounded in the back. You have a stretcher which must be used to transport the wounded man across the stream. You have three planks. You must not touch contaminated areas or the water with any piece of equipment or any part of your body. Take all equipment with you to avoid leaving clues to your passage. You may not jump from one set of pilings to another. Be careful and work quickly.

Safety:

Instructor spotter should be placed somewhere in the structure to make sure the boards are placed firmly before and while someone climbs on them.

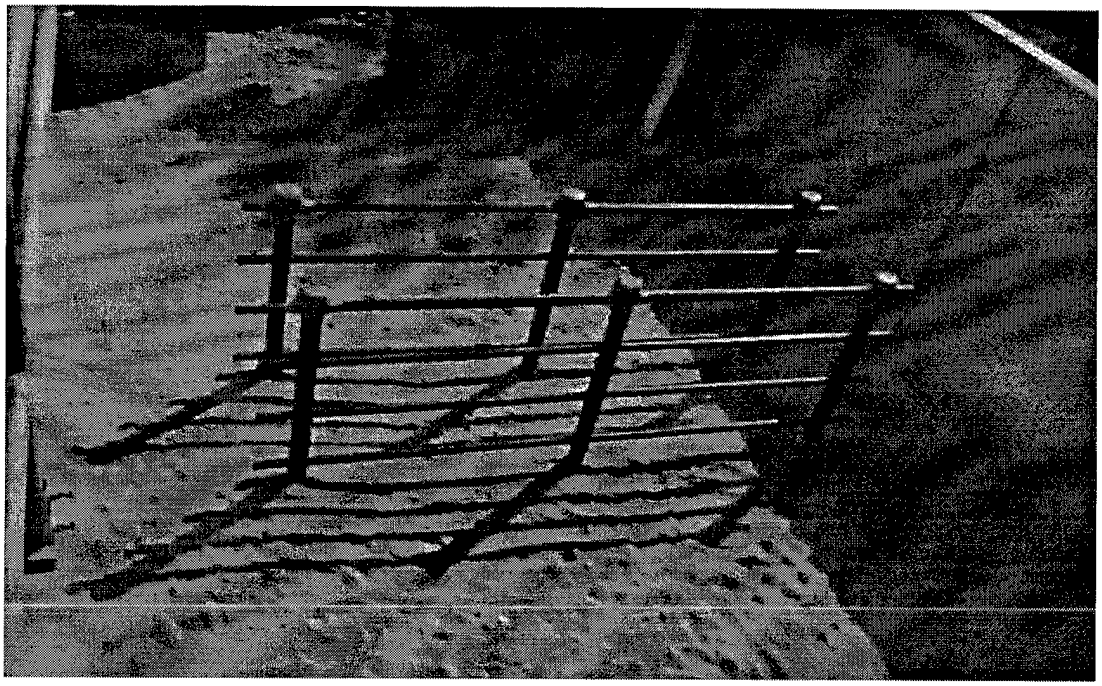
Fouls and Penalties:

a. Person or equipment touching water or any area painted red - 30 sec.
b. Stretcher or dummy dropped - start over.
c. Plank falling into water - 60 sec and reposition.
d. Person falling into water - 60 sec and person starts over.
e. Help from non participants or catwalk (60 sec for first offense and add 30 sec for each additional violation, i.e., second violation would get 90 sec penalty).

Solution:

Step 1 - Team members place boards on white area of bridge pilings to get across object.
Step 2 - Pass the stretcher with the wounded man across as your first goal.
Step 3 - Once the stretcher is across, the rest of the team should cross the bridge.
Step 4 - A variety of ways can be used to cross the bridge.

Station 8 - Dr. No's Laboratory



Number of Team Members: 7

Equipment:

Type	Number	Dimensions
Pole	3	5" diameter x 10 feet
Pole	1	5" diameter x 6 feet
Pole	1	5" diameter x 5 feet
Rope	1	4 feet
Barrel	1	55 gallon

Set-up:

Place all equipment on the NE corner of the obstacle at the beginning.

Task:

You have just landed by parachute in this area. Your mission is to destroy an enemy experimental laboratory. You are to cross this double fence before the guard returns. Use the equipment placed near the fence. You must take the barrel with you. Caution--it must be handled very carefully as it contains your demolition tools. All

members of your team are required to cross. All equipment you use must be taken with you. You must not touch any part of the fence with anything. It is wired so that it will set off an alarm. The ground between the fences is heavily mined and cannot be touched by any people or equipment. A guard passes here every fifteen minutes. He just passed. Go ahead.

Safety:

a. Place spotters around the obstacle.
b. Do not get hit by any of the poles or other equipment.

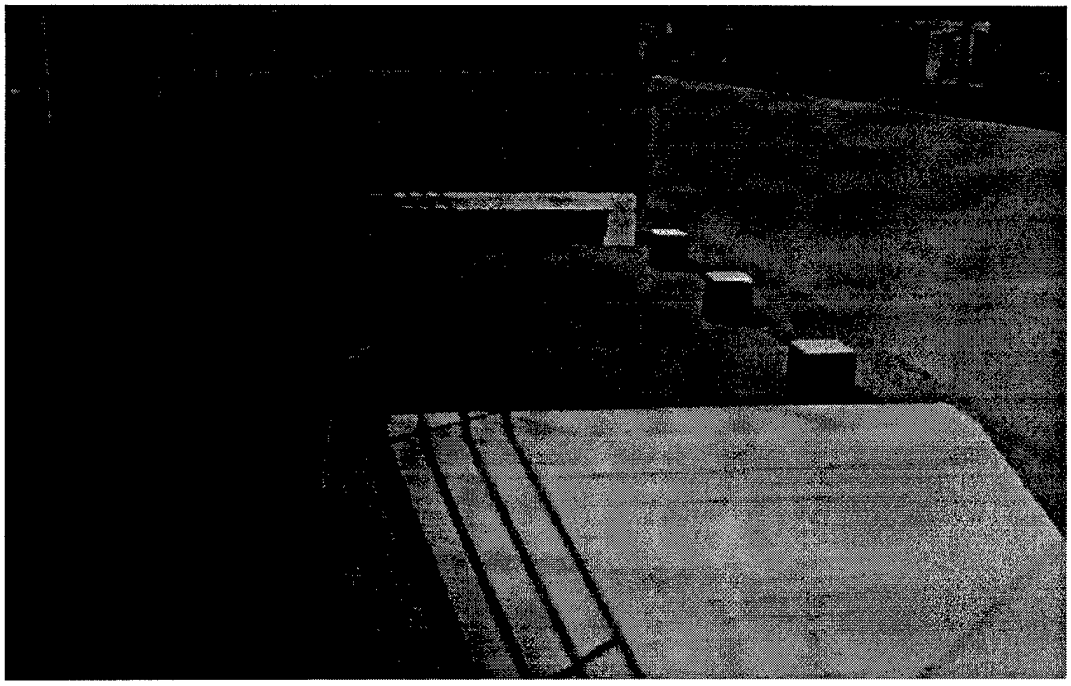
Fouls and Penalties:

a. Person or equipment touching fence - 30 sec and reposition.
b. Person or equipment falling on fence or mined area - 30 sec and person and/or equipment starts again.
c. Dropping barrel - 30 sec and entire team starts over.
d. Rough handling of barrel - 30 sec and barrel starts again.
e. Help from non participants or catwalk (60 sec for first offense and add 30 sec for each additional violation, i.e., second violation would get 90 sec penalty).

Solution:

Step 1 - Team should place log(s) through the fence while avoiding red areas on fences.
Step 2 - Balance log(s) on barrel, still keeping them from touching red.
Step 3 - Use leverage to get first team member through.
Step 4 - All team members, except two, cross.
Step 5 - Remaining members pass barrel across to the other people.
Step 6 - Use barrel on the opposite side of the fence with poles to get remaining team members across.

Station 9 - Cam Rahn Bay



Number of Team Members: 9

Equipment:

Type	Number	Dimensions
Barrel	1	55 gallon
Plank	2	3" x 9" x 8'
Plank	2	3" x 9" x 12'
Plank	1	3" x 9" x 10'
Plank	1	3" x 9" x 9' 3"
Wheelbarrow	1	30 lbs.

Set-up:

Place all equipment at the beginning of the bridge.

Task:

Heavy monsoon rains have made aerial resupply of your special forces camp impossible. Your mission is to take a barrel across this stream to a supply cache to pick up vitally needed food and communications equipment. Monsoon floods have swept

away most of the bridge on your route. You have found this pile of planks. You must take enough equipment with you to the other side to insure your safe return at a later time. Any equipment falling into the water will be swept away by the swift current. No one may touch the red areas.

Safety:

a. Spotters should only be on the land side of the obstacles.
b. As people begin to cross, insure they fall into the water rather than hitting the cement uprights.
c. When (if) the wheelbarrow goes across, insure you are not hit by it if it falls.
d. Watch for falling planks.

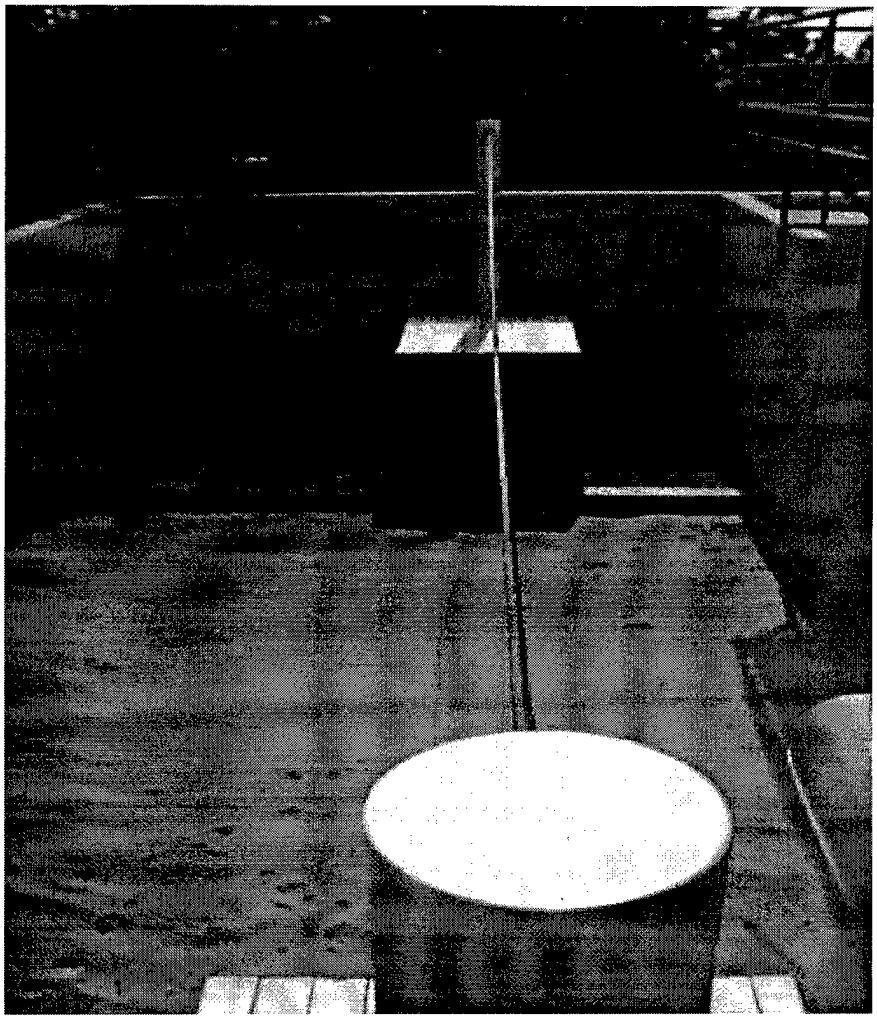
Fouls and Penalties:

a. Person falls in water - 30 sec and person starts over.
b. Person touches red area - 30 sec.
c. Plank falls in water - equipment lost. (If three planks fall in water, start problem over again.)
d. Equipment touches water - 30 sec and reposition equipment.
e. Wheelbarrow falls in water - 60 sec and start over.
f. Help from non participants or catwalk (60 sec for first offense and add 30 sec for each additional violation, i.e., second violation would get 90 sec penalty).

Solution:

Step 1 - Team should find plank(s) and lay them on the white parts of the blocks. Strongest people should handle the planks.
Step 2 - After bridge is developed, team must bring the barrel across. (Do not have to use wheelbarrow.)
Step 3 - Team should bring at least one board with them to insure a safe return.

Station 10 - Cliffhanger



Number of Team Members: 8

Equipment:

Type	Number	Dimensions
Rope	2	30 feet
Rope	4	6 feet
Yokes	2	Tree forks
Pipe	2	3/4" diameter x 7'

Set-up:

a. Place 30' ropes coiled on far platform.

b. Place all other equipment on near platform.
c. One team member must act as the wounded man.

Task:

You are a rescue team that has found an injured man at the edge of this stream of quicksand. He has a broken leg and has passed out due to pain and shock. You must get him and your team across this quicksand before dark, which is only fifteen minutes away. You have spotted two members from another team on the far side of the stream, but you are unable to communicate verbally with them due to the proximity of the enemy. The nights are extremely cold in this area and you have meager means of keeping the injured man warm. You cannot touch the quicksand or any red area with any part of your body or equipment. The injured man cannot help. You must work quickly.

Safety:

a. A spotter should follow any person crossing the gulch.
b. Two spotters must follow the wounded man across. Remember, he is tied up and won't be able to break a fall if the ropes fail.

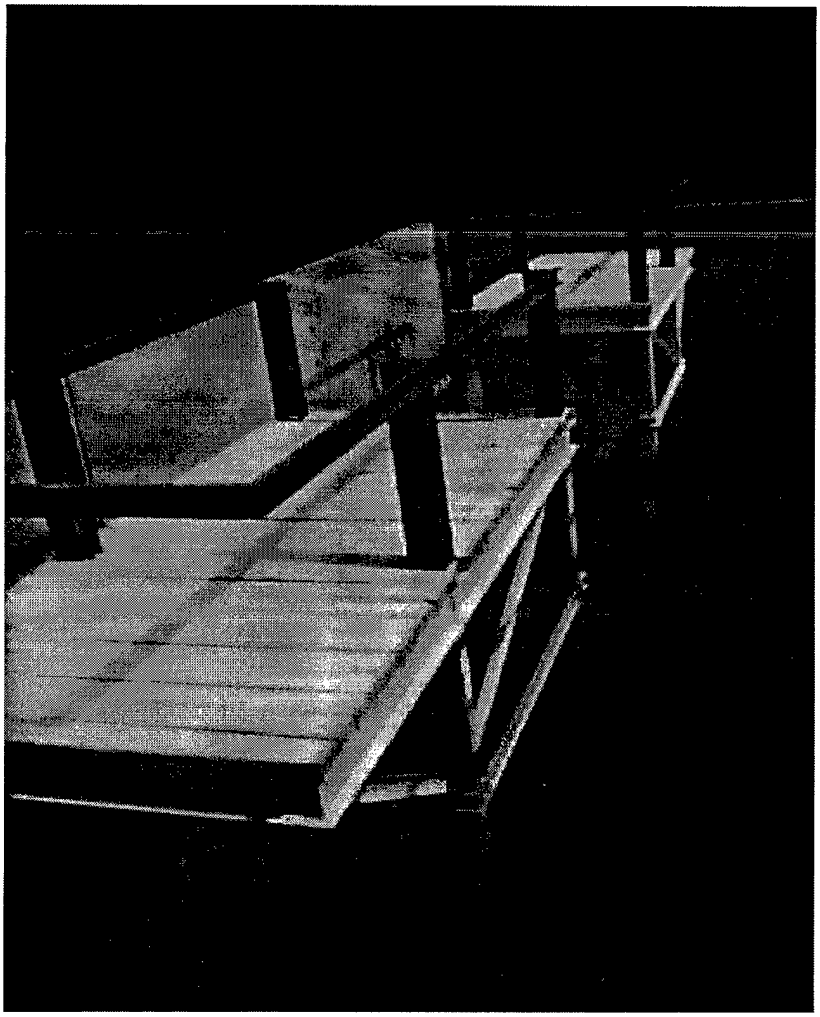
Fouls and Penalties:

a. Person or equipment touching red area or quicksand - 30 sec and person/equipment starts again.
b. Talking between platforms - 60 sec.
c. Rough handling of injured person or injured person helping - 30 sec.
d. Dropping injured person - 60 sec and entire team starts over.
e. Dropping equipment into quicksand - 30 sec and loss of equipment.
f. Help from non participants or catwalk (60 sec for first offense and add 30 sec for each additional violation, i.e., second violation would get 90 sec penalty).

Solution:

Step 1 - A strong team member should bring the rope over to the starting side by going across the cable with feet and hands.
Step 2 - Tie the rope to the man so that he can be pulled across.
Step 3 - All members except strongest should pass to the other side. One member must take the end of the rope with him/her.
Step 4 - Tie the man to the cable and have members pull him to the other side while last and strongest member supports the man to insure safety.

Station 11 - Barrel Roll



Number of Team Members: 9

Equipment:

Type	Number	Dimensions
Plank	2	3" x 12" x 6'
Barrel	1	55 gallon
Rope	2	25 feet
Rope	2	6 feet

Set-up:

a. Place 25' ropes, crate, and planks on the beginning platform.

b. Place 6' ropes on the opposite platform.

Task:

You are returning from behind enemy lines. An enemy patrol discovers your presence and notifies other elements in this area. You estimate that you have about a fifteen minute lead. You have followed a deep canyon and found the only bridge within 25 miles. The strongest member of your team was able to cross before the center span collapsed. You must avoid capture because you have vital information and classified demolition parts which are needed by your unit. These are packed in a barrel and must be carefully handled. You may use any equipment found on either span of the bridge. You must move your team and all equipment to the far span or insure that is does not fall into enemy hands. You cannot touch any part of the bridge that is painted red not the area between the spans.

Safety:

a. Place spotters on both sides underneath those going across the span.
b. Do not get in the way of the barrel if it falls.

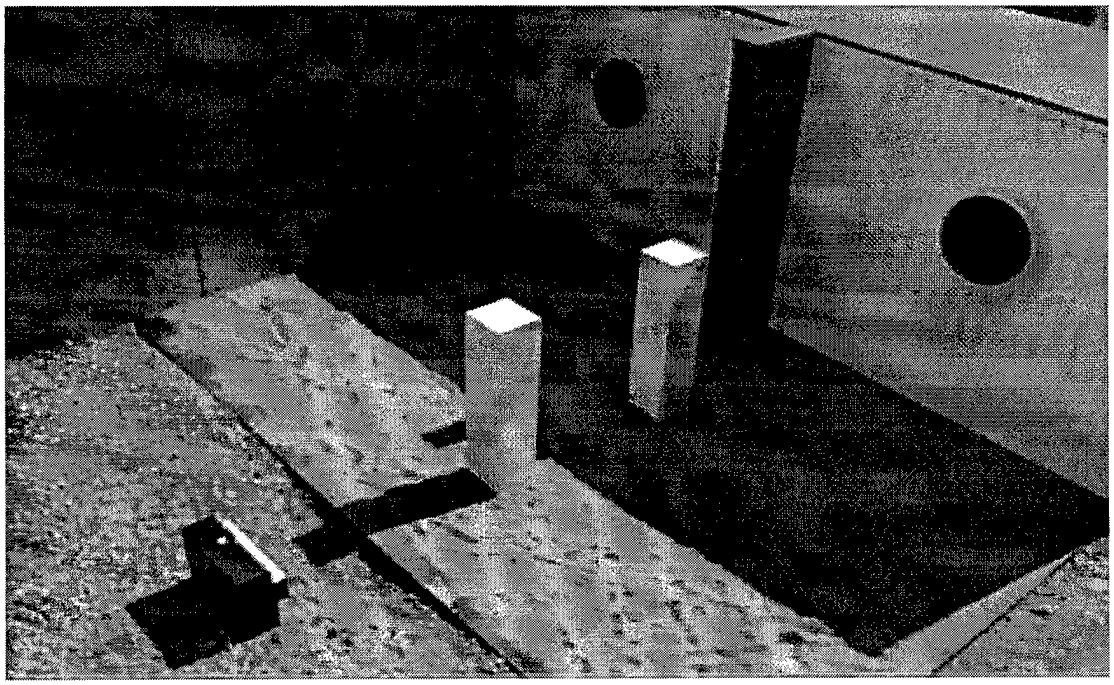
Fouls and Penalties:

a. Person or equipment touching red - 30 sec.
b. Person touching the ground - 30 sec and person starts over.
c. Person falling into canyon - 60 sec and person starts over.
d. Rope falling into canyon - loss of rope. (If second long rope is lost, start task over.
e. Barrel falling into canyon - start task again.
f. Help from non participants or catwalk (60 sec for first offense and add 30 sec for each additional violation, i.e., second violation would get 90 sec penalty).

Solution:

Step 1 - Two members (one should be on the other side) should tie the rope to the crossbars underneath the structure.
*The rope should be tied to the upper half of the X.
*It should go diagonally across the structure.
*It must be tight.
Step 2 - Lay the board(s) on top of the rope to ease walking across OR just climb across.
Step 3 - The last two should try to slide the barrel across to other teammates.
Step 4 - All should cross to the other side.

Station 12 - Baghdad Sewers



Number of Team Members: 8

Equipment:

Type	Number	Dimensions
Plank	1	2" x 8" x 6'
Plank	1	2" x 8" x 5'
Box of TNT	1	About 40 lbs.

Set-up:

a. Place shorter plank and box in N tunnel.
b. Place shorter plank in S tunnel.

Task:

You are members of an Air Force commando unit that has parachuted behind enemy lines. Your mission is to find and destroy a USAF F-117A that has fallen into enemy hands. During your search mission you encounter a vertical abutment. You decide to continue your search by moving through these culverts. You may use anything you find in the immediate area to assist with your mission. You must take the box of

demolition equipment and anything you use with you. All team members must pass through the obstacle to the other side. No jumping is allowed. Do not touch or allow equipment to touch any water or red areas.

Safety:

a. Make sure people fall into the water rather than jump for side.
b. The only danger spot is the arrival point on the land after crossing the water.

Fouls and Penalties:

a. Person jumping - 60 sec and person starts again.
b. Person or equipment touches water or red area - 60 sec.
c. Person, demolition box, or long board falling into water - 60 sec and start task again.
d. Short board falling into water - loss of board.
e. Help from non participants or catwalk (60 sec for first offense and add 30 sec for each additional violation, i.e., second violation would get 90 sec penalty).

Solution:

Step 1 - Members should use left tunnel due to the ability of the longest board (in right tunnel) to reach the first platform.
Step 2 - The members should lay the longest board from the tunnel to the first platform.
Step 3 - Lay the shorter board from the first to the second platform.
Step 4 - As many members as possible should sit on the short board and pass the longest board back and forth as needed from the tunnel to the final platform. All members should slide down to safety.

APPENDIX D

HORIZONTAL TEAM MEMBER EXCHANGE II

HORIZONTAL TEAM MEMBER EXCHANGE II

This section has been selected to execute a clandestine military operation. You will be air dropped behind enemy lines and have 3 days to complete your mission and return to the evacuation zone. We are currently developing your training program to prepare you for this mission. This mission requires a lot of teamwork and we need to customize your training accordingly. To do this, it is important for us to understand how well you think you will work with **your classmates in this section**. Using the scale below, indicate how much you **Agree** with the following statements.

1. **(A) Strongly Disagree**
2. **(B) Disagree**
3. **(C) Slightly Disagree**
4. **(D) Neither Agree nor Disagree**
5. **(E) Slightly Agree**
6. **(F) Agree**
7. **(G) Strongly Agree**

1. I get along well with my classmates.
2. My classmates will say that they get along well with me.
3. I can count on my classmates to help me out.
4. My classmates will say that they can count on me to help them out.
5. My classmates abilities will make them excellent teammates.
6. My classmates will say that my abilities will make me an excellent teammate.
7. I like my classmates.
8. My classmates will say they like me.
9. I can trust my classmates to stick by me when things get difficult.
10. My classmates will say that they can trust me to stick by them when things get difficult.
11. My classmates will do an excellent job on this team.
12. My classmates will say I will do an excellent job on this team.
13. My classmates and I have a good working relationship.
14. My classmates will say that we have a good working relationship.

APPENDIX E

TEAM DEVELOPMENT INVENTORY

TEAM DEVELOPMENT INVENTORY

This section has been selected to execute a clandestine military operation. You will be air dropped behind enemy lines and have 3 days to complete your mission and return to the evacuation zone. We are currently developing your training program to prepare you for this mission. This mission requires a lot of teamwork and we need to customize your training accordingly. To do this, it is important for us to understand how well you think you will work with the other students in this section. Using the scale below, indicate how much you **Agree** with the following statements.

1. (A) Strongly Disagree
2. (B) Disagree
3. (C) Slightly Disagree
4. (D) Neither Agree nor Disagree
5. (E) Slightly Agree
6. (F) Agree
7. (G) Strongly Agree

On this clandestine mission, my classmates in this section will...

1. be friendly and concerned about each other.
2. acknowledge and confront conflict openly.
3. listen to one another with sensitivity and understanding.
4. recognize and respect each others individual differences.
5. have high standards for their individual work and the teams' performance.
6. look to each other for consultation on resolving challenges.
7. recognize and reward team achievements.
8. encourage and appreciate comments about each others efforts.

APPENDIX F

CONSENT FORM

CONSENT FORM

You are being asked to complete two instruments that will take you about 15 minutes to complete. You are being asked to do this two times, 1 month apart. The paper and pencil evaluations are considered standard measures of group dynamics. You will also participate in training conducted on the Leadership Reaction Course. No possible risks are anticipated as a result of this study.

The evaluations will be collected and analyzed by the researcher and your responses will be confidential and remain anonymous in any reports and/or publications of research findings. It is expected that this research will be useful in program evaluation and development. This information will be used to help establish credibility of experiential learning in the field of team development.

Participation in this research effort is completely voluntary. You may discontinue participation at any time, for any reason, with no penalties of any kind. Any questions regarding this study can be directed to: Captain Dan Miller (719) 598-3380 or Major Earl Nason (719) 333-4018.

Consent. I, the undersigned, have read this informed consent agreement and understand all its terms. My signature below indicates my agreement to participate in the training and research as described. I further acknowledge that the researcher and his facilitators have satisfactorily answered any questions I have at this point and will be available to answer questions I may have during the course of this study. I understand that I am free to withdraw this consent and discontinue participation in this study at any time without penalty.

Participant Signature_____ Date_____

APPENDIX G

HORIZONTAL TEAM MEMBER EXCHANGE DATA

HORIZONTAL TEAM MEMBER EXCHANGE DATA

				Pretest															Posttest													
Instructor	Section	Group	Gender	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8	Question 9	Question 10	Question 11	Question 12	Question 13	Question 14	Pretest Mean	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8	Question 9	Question 10	Question 11	Question 12	Question 13	Question 14	Posttest Mean
Johnson	M1A	control	male	6	6	6	6	3	6	6	6	6	6	5	6	5	5	5.57	6	6	4	6	5	7	6	6	4	6	4	6	5	5	5.43
Johnson	M1A	control	male	7	7	6	6	6	6	6	6	6	6	6	6	6	6	6.14	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Johnson	M1A	control	female	7	7	6	6	6	5	7	6	4	5	6	6	6	6	5.93	7	6	6	6	6	5	6	6	5	6	6	6	6	6	5.93
Johnson	M1A	control	male	6	6	6	6	5	6	5	5	6	6	6	6	7	7	5.93	6	6	6	6	6	6	5	5	6	6	6	6	5	5	5.71
Johnson	M1A	control	male	6	6	5	6	6	6	6	6	6	6	6	6	6	6	5.93	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Johnson	M1A	control	male	6	5	6	5	6	5	5	4	5	4	5	4	6	6	5.14	6	5	6	5	6	5	6	5	6	5	6	5	6	5	5.50
Johnson	M1A	control	female	6	6	6	6	5	5	6	6	7	7	7	6	6	6	6.07	6	6	5	6	6	6	6	6	5	5	6	6	6	6	5.79
Nason	M2B	control	male	6	4	6	7	6	7	6	4	6	6	6	7	6	6	5.93	7	7	6	6	6	6	6	6	6	7	6	6	6	7	6.29
Nason	M2B	control	male	7	7	6	6	6	6	6	6	6	6	6	6	6	6	6.14	7	6	6	6	6	6	6	6	4	5	6	6	6	6	5.86
Nason	M2B	control	male	4	4	3	5	4	5	5	4	4	6	4	4	4	6	4.43	5	5	4	5	4	4	5	5	5	5	5	4	5	5	4.71
Nason	M2B	control	male	5	5	6	6	5	5	4	5	3	5	4	4	5	5	4.79	5	6	5	5	5	5	5	6	6	5	6	6	6	5.43
Nason	M2B	control	male	6	6	5	6	5	6	5	5	5	6	5	6	5	5	5.43	5	5	4	6	4	5	5	5	4	6	4	5	5	5	4.86
Nason	M2B	control	male	6	6	5	5	5	5	6	6	5	5	6	6	6	6	5.57	6	6	6	6	6	6	6	6	6	6	6	6	5	5	5.86
Nason	M2B	control	female	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6.07	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6.07
Nason	M2B	control	male	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4.14	4	4	3	4	4	4	4	4	2	4	2	4	2	2	3.36
Nason	M2B	control	male	6	4	4	6	4	5	4	3	4	6	4	4	4	4	4.43	6	6	4	4	4	4	4	4	4	4	6	5	5	5	4.64
Nason	M2B	control	female	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	4	5	6	4	4	5	5	6	6	5.36
Nason	M2B	control	male	6	6	6	6	6	5	5	6	6	7	6	6	6	6	5.93	6	6	5	5	6	6	6	6	5	5	6	6	5	5	5.57
Nason	M2B	control	male	6	6	6	6	6	5	6	5	5	5	5	5	6	6	5.57	6	5	6	5	6	5	6	5	5	5	6	5	5	5	5.36
Boyce	M3B	control	male	6	6	6	6	5	5	6	6	5	6	5	5	6	6	5.64	6	6	5	6	6	6	5	6	5	7	6	5	6	6	5.79
Boyce	M3B	control	male	6	5	5	6	6	4	5	4	6	6	6	6	5	5	5.36	5	6	6	5	5	5	5	6	5	6	6	5	5	5	5.36
Boyce	M3B	control	male	5	4	5	4	7	4	6	4	6	4	6	4	6	4	4.93	5	4	5	5	5	4	6	4	5	4	6	4	5	4	4.71
Boyce	M3B	control	male	6	6	5	5	6	4	6	6	6	5	6	7	6	6	5.71	7	6	6	6	5	6	6	6	6	6	6	6	6	6	6.00
Boyce	M3B	control	male	6	6	5	5	5	5	6	6	5	5	5	5	6	6	5.43	6	6	5	5	5	5	5	5	5	5	5	5	5	5	5.14
Boyce	M3B	control	male	6	6	6	5	7	5	7	6	6	6	5	5	6	6	5.79	6	6	5	6	7	5	6	6	6	6	6	6	7	7	6.07
Schwenn	M4A	control	male	6	6	7	7	7	7	7	7	7	7	7	7	7	7	6.86	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7.00
Schwenn	M4A	control	male	6	6	5	5	5	5	5	5	3	4	4	4	5	5	4.79	5	5	5	5	4	4	5	4	4	5	5	5	4	4	4.57
Schwenn	M4A	control	male	5	5	4	4	5	5	5	5	5	5	5	5	5	5	4.86	4	5	5	5	4	5	5	5	4	4	4	5	5	5	4.64
Schwenn	M4A	control	male	6	6	6	6	7	6	6	6	5	5	6	6	6	6	5.93	6	5	5	6	6	6	6	6	6	6	6	6	6	6	5.86
Schwenn	M4A	control	male	7	7	6	6	6	6	7	6	6	6	6	5	6	6	6.14	7	6	7	6	6	6	7	6	6	6	6	6	6	6	6.21
Schwenn	M4A	control	male	6	5	5	5	5	5	4	4	3	3	3	3	3	3	4.07	3	3	3	2	2	2	2	2	2	3	2	2	2	2	2.29
Schwenn	M4A	control	male	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7.00	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7.00
Schwenn	M4A	control	male	5	4	3	5	5	4	4	4	4	4	5	4	4	4	4.21	6	5	6	6	6	6	6	6	5	6	6	6	6	6	5.86
Schwenn	M4A	control	female	6	6	7	7	6	6	6	6	7	7	6	6	7	7	6.43	7	7	7	7	6	6	6	6	7	7	6	6	6	6	6.43
Schwenn	M4A	control	male	6	5	6	6	4	4	6	5	5	5	3	3	5	5	4.86	6	6	6	6	6	5	7	6	6	6	6	5	5	5	5.79
Schwenn	M4A	control	female	6	6	5	5	5	5	5	5	5	5	5	5	5	5	5.14	6	6	5	6	6	6	6	5	5	5	6	6	6	6	5.71
Schwenn	M4A	control	male	6	6	6	6	6	5	6	6	6	6	6	6	6	6	5.93	6	6	6	4	6	6	6	5	5	5	6	6	6	6	5.64
Schwenn	M4A	control	male	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Schwenn	M4A	control	male	7	5	6	6	5	6	7	7	4	4	7	7	5	5	5.79	6	6	6	6	6	6	7	7	6	6	6	7	7	7	6.36
Sanders	T4B	control	female	5	5	6	5	6	5	5	5	6	6	6	6	6	6	5.57	6	6	6	5	6	6	5	5	6	6	7	6	6	6	5.86
Sanders	T4B	control	male	6	6	6	6	6	6	6	6	5	6	6	6	6	6	5.93	7	6	6	6	6	6	6	7	6	7	7	6	7	7	6.43
Sanders	T4B	control	male	7	7	6	6	6	6	6	6	5	6	5	6	7	7	6.14	7	7	6	6	6	6	6	7	6	6	6	7	7	7	6.43
Sanders	T4B	control	male	7	6	7	6	6	6	7	7	6	7	7	7	7	7	6.64	7	6	6	6	7	6	6	6	5	6	7	7	6	6	6.21
Sanders	T4B	control	male	6	6	6	7	4	6	5	5	6	6	6	6	7	7	5.93	6	6	5	6	5	6	5	6	6	6	6	6	6	6	5.79
Sanders	T4B	control	male	6	6	6	6	5	6	6	6	5	6	6	6	7	7	6.00	7	7	7	7	6	7	6	6	6	6	6	6	6	6	6.36
Sanders	T4B	control	male	6	6	5	5	6	6	5	5	5	6	6	6	6	6	5.64	4	4	5	4	5	5	6	4	4	4	4	4	4	4	4.36
Sanders	T4B	control	male	6	5	5	5	7	5	6	6	7	7	6	4	5	5	5.64	6	6	6	5	7	5	6	6	6	6	7	5	6	6	5.93

				Pretest															Posttest													
Instructor	Section	Group	Gender	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8	Question 9	Question 10	Question 11	Question 12	Question 13	Question 14	Pretest Mean	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8	Question 9	Question 10	Question 11	Question 12	Question 13	Question 14	Posttest Mean
Gibb	T5A	control	female	7	6	6	6	7	5	6	6	5	6	7	6	5	5	5.93	6	6	6	6	6	5	6	5	5	5	7	5	5	5	5.57
Gibb	T5A	control	female	6	5	5	6	5	5	5	5	4	4	5	6	6	5	5.14	7	6	6	6	7	6	6	6	5	6	6	6	6	6	6.07
Gibb	T5A	control	female	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7.00	6	6	7	7	6	6	7	7	7	7	7	7	7	7	6.71
Gibb	T5A	control	female	7	6	6	6	7	6	7	7	7	6	7	6	7	7	6.57	7	7	7	7	7	6	7	7	6	7	7	6	7	7	6.79
Hickox	T6A	control	male	6	4	4	4	6	4	2	4	3	6	7	7	2	6	4.64	4	6	2	2	6	6	6	5	3	4	6	7	2	6	4.64
Hickox	T6A	control	male	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Hickox	T6A	control	male	5	6	6	6	6	6	6	6	6	6	5	5	5	5	5.64	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7.00
Hickox	T6A	control	male	7	7	7	7	6	7	7	7	6	7	6	7	6	6	6.64	3	3	3	3	3	3	3	3	2	1	3	2	1	3	2.57
Hickox	T6A	control	male	6	4	6	6	5	6	5	6	5	5	6	6	6	6	5.57	5	5	5	5	4	6	5	6	5	6	5	5	3	6	5.07
Hickox	T6A	control	male	7	6	6	7	6	6	6	6	6	6	6	6	6	6	6.14	6	6	6	6	6	5	5	6	6	6	6	6	6	6	5.86
Thul	T7A	control	male	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Thul	T7A	control	male	6	6	6	6	6	6	6	6	7	7	6	6	6	6	6.14	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Thul	T7A	control	male	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6.07	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Thul	T7A	control	male	6	6	6	6	6	6	7	6	6	7	7	7	6	6	6.29	7	6	7	7	6	6	6	7	7	7	7	7	7	7	6.64
Thul	T7A	control	male	6	6	6	6	5	5	6	5	6	7	5	4	6	6	5.64	6	6	6	6	6	6	6	4	4	6	7	6	6	6	5.79
Thul	T7A	control	male	5	5	6	6	5	5	5	5	6	6	5	5	6	6	5.43	6	6	5	5	6	6	6	5	6	6	6	6	6	5	5.71
Thul	T7A	control	male	6	6	6	6	6	6	7	7	6	6	7	7	6	6	6.29	6	6	6	7	6	6	6	6	6	6	7	7	6	6	6.21
Thul	T7A	control	male	7	7	7	7	7	7	6	7	7	6	7	7	6	6	6.79	7	6	6	7	5	6	6	6	6	6	6	6	6	6	6.07
Schwenn	M1B	experimental	male	6	6	7	7	6	6	6	6	7	7	7	7	6	6	6.43	7	6	6	7	7	6	6	6	7	7	7	6	7	7	6.57
Schwenn	M1B	experimental	male	5	6	5	5	6	5	5	5	5	5	6	5	5	6	5.29	5	5	4	4	5	5	4	4	5	5	5	5	4	4	4.57
Schwenn	M1B	experimental	male	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Schwenn	M1B	experimental	male	6	6	5	5	4	4	5	5	5	6	6	6	5	6	5.29	5	5	5	6	5	6	5	5	4	5	6	6	6	6	5.36
Schwenn	M1B	experimental	male	6	5	6	6	4	6	5	5	6	6	6	6	5	5	5.50	6	6	6	6	3	7	5	6	6	6	5	6	6	6	5.71
Johnson	M2A	experimental	male	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Johnson	M2A	experimental	female	6	6	6	6	7	6	7	7	6	6	7	7	7	7	6.50	6	6	6	6	7	6	6	6	7	7	6	6	6	6	6.21
Johnson	M2A	experimental	male	6	6	7	7	7	6	6	6	5	5	6	6	6	6	6.07	6	6	6	6	7	6	6	6	5	5	7	6	6	6	6.00
Johnson	M2A	experimental	male	6	6	6	6	5	6	5	5	5	6	5	6	6	5	5.50	6	6	6	6	6	6	6	5	7	6	6	7	6	5	6	6.00
Johnson	M2A	experimental	female	7	7	6	6	5	5	5	6	6	6	5	6	6	6	5.86	6	6	6	6	6	6	6	6	7	5	6	6	7	7	7	6.21
Johnson	M2A	experimental	male	6	6	6	6	5	5	6	6	6	6	6	5	6	6	5.79	6	6	6	6	6	6	6	6	7	7	6	6	6	6	6.14
Johnson	M2A	experimental	male	7	7	7	6	7	6	7	7	7	7	6	7	6	7	6.71	6	6	6	6	6	6	6	6	6	6	6	5	6	6	5.93
Johnson	M2A	experimental	female	7	6	6	6	7	7	7	6	6	6	7	6	6	6	6.36	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Johnson	M2A	experimental	male	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Nason	M4A	experimental	male	4	4	5	5	6	5	5	5	6	6	6	6	5	5	5.21	6	6	7	7	7	6	6	6	6	6	6	6	6	6	6.21
Nason	M4A	experimental	female	6	6	6	6	6	6	5	5	6	6	6	6	6	6	5.86	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Nason	M4A	experimental	male	6	5	6	6	6	6	5	5	5	6	6	6	5	6	5.64	6	7	5	6	5	6	6	7	6	7	6	7	6	7	6.21
Nason	M4A	experimental	male	6	6	5	5	6	6	6	6	5	5	6	6	5	5	5.57	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Nason	M4A	experimental	male	4	4	6	6	5	5	4	5	5	5	5	6	6	6	5.07	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Nason	M4A	experimental	male	6	6	5	5	6	6	6	5	6	6	6	6	5	5	5.64	6	5	7	7	7	7	7	7	7	7	7	7	7	7	6.79
Nason	M4A	experimental	male	6	6	6	6	5	5	6	6	5	5	4	4	6	6	5.43	6	6	5	5	5	5	5	5	5	6	4	4	5	5	5.07
Nason	M4A	experimental	male	4	4	5	4	4	4	5	5	6	6	5	5	5	5	4.79	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4.07
Nason	M4A	experimental	male	5	5	5	6	6	6	5	6	5	6	6	6	5	6	5.57	5	5	6	5	6	5	5	5	6	5	6	5	6	6	5.43
Nason	M4A	experimental	male	6	6	7	7	7	7	7	7	7	7	6	6	6	6	6.57	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7.00
Sanders	M6A	experimental	male	6	6	5	5	5	5	5	4	4	5	5	6	6	5.14	6	6	6	6	7	6	5	5	5	5	6	6	6	5	5.71
Sanders	M6A	experimental	male	6	6	5	5	6	6	7	7	7	7	7	7	6	6	6.29	7	7	7	7	7	7	6	7	7	7	7	7	6	6	6.79
Sanders	M6A	experimental	male	6	6	5	4	5	4	5	5	4	4	5	5	6	6	5.00	5	5	6	6	5	6	6	6	5	5	4	5	6	6	5.43
Sanders	M6A	experimental	male	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	6	6	6	5	6	6	6	6	6	5.93
Sanders	M6A	experimental	male	7	7	6	6	6	6	6	6	5	5	6	6	7	7	6.14	7	7	7	7	6	6	7	7	6	6	6	6	7	7	6.57
Sanders	M6A	experimental	male	7	6	6	5	4	5	6	7	5	6	5	6	6	6	5.71	6	7	5	6	6	7	6	5	7	7	6	5	6	7	6.14
Sanders	M7A	experimental	male	6	6	7	7	6	6	7	7	7	7	7	6	6	6	6.50	6	6	6	6	6	6	7	7	6	6	6	6	6	6	6.14
Sanders	M7A	experimental	male	6	6	6	5	5	6	5	6	6	7	6	6	6	6	5.86	6	6	6	6	6	6	5	6	6	6	5	6	6	6	5.86
Sanders	M7A	experimental	male	6	6	6	6	7	6	7	6	6	6	7	6	6	6	6.21	6	6	6	6	7	6	6	6	6	6	7	7	6	6	6.21
Sanders	M7A	experimental	male	7	6	6	5	6	6	6	5	5	6	6	6	6	6	5.86	6	6	5	5	5	6	6	6	5	6	6	6	6	6	5.71
Sanders	M7A	experimental	male	7	7	7	7	6	6	7	7	6	7	7	7	7	7	6.79	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7.00

				Pretest															Posttest													
Instructor	Section	Group	Gender	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8	Question 9	Question 10	Question 11	Question 12	Question 13	Question 14	Pretest Mean	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8	Question 9	Question 10	Question 11	Question 12	Question 13	Question 14	Posttest Mean
Hickox	T2A	experimental	female	6	6	6	6	6	6	6	6	5	5	6	6	6	6	5.86	6	6	5	5	5	5	5	5	5	5	5	6	6	5.29
Hickox	T2A	experimental	male	6	6	5	5	5	5	6	6	6	6	6	6	6	6	5.71	6	6	4	4	6	5	6	5	5	5	6	5	5	5	5.21
Hickox	T2A	experimental	male	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Hickox	T2A	experimental	male	6	6	5	5	4	5	4	4	4	4	4	4	5	4	4.57	6	6	6	6	5	6	5	6	6	6	6	6	6	6	5.86
Hickox	T2A	experimental	male	6	6	6	5	6	5	5	5	6	5	6	5	6	6	5.57	5	5	4	4	5	5	4	4	4	4	5	5	5	5	4.57
Hickox	T2A	experimental	male	4	2	5	6	6	4	5	4	4	5	5	5	3	3	4.36	4	4	3	3	5	4	4	4	4	4	5	4	4	4	4.00
Hickox	T2A	experimental	male	6	6	6	6	6	6	6	5	5	6	6	6	5	5	5.71	6	6	6	6	5	5	5	5	5	6	6	6	5	5	5.50
Hickox	T2A	experimental	male	6	4	5	4	6	5	4	4	5	5	6	5	6	6	5.07	6	5	5	5	6	5	5	4	5	5	6	5	5	5	5.14
Hickox	T5B	experimental	male	6	5	6	5	6	5	6	5	4	4	6	4	6	5	5.21	5	6	6	6	6	5	6	5	5	6	6	5	6	6	5.64
Hickox	T5B	experimental	female	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6.00
Hickox	T5B	experimental	male	6	6	6	6	7	6	7	7	6	6	6	7	7	7	6.43	7	7	6	7	7	7	7	7	7	7	6	7	6	7	6.79
Hickox	T5B	experimental	male	7	7	7	7	6	7	7	7	6	6	6	6	6	6	6.50	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7.00
Hickox	T5B	experimental	male	6	6	5	5	6	5	6	6	5	5	6	6	5	5	5.50	6	6	6	6	5	5	6	6	5	5	6	6	5	5	5.57
Hickox	T5B	experimental	male	5	5	2	6	4	6	5	5	4	5	6	5	6	4	4.86	5	4	6	6	3	5	4	4	6	6	5	5	6	6	5.07
Hickox	T5B	experimental	female	6	6	6	6	3	5	4	4	5	6	4	5	4	5	4.93	5	6	5	6	6	5	4	5	4	5	6	5	5	6	5.21
Hickox	T5B	experimental	male	6	5	4	6	6	6	6	5	7	7	7	6	5	6	5.86	6	3	6	5	7	6	6	5	6	4	6	6	5	5	5.43
Gibb	T7A	experimental	male	6	5	6	6	5	5	4	4	5	6	5	6	5	6	5.29	6	5	7	7	5	4	6	6	5	6	5	5	6	6	5.64
Gibb	T7A	experimental	female	7	5	6	6	6	5	7	7	6	6	6	5	5	5	5.86	6	6	3	6	6	7	7	5	6	6	7	7	6	6	6.00
Gibb	T7A	experimental	male	7	7	7	6	6	6	7	6	7	7	6	6	6	6	6.43	7	6	7	7	6	6	7	7	6	6	7	7	7	7	6.64
Gibb	T7A	experimental	female	6	6	7	7	6	5	5	5	7	7	6	6	6	6	6.07	7	7	7	7	6	6	6	6	7	7	7	6	7	7	6.64
Gibb	T7A	experimental	male	7	6	7	7	6	6	6	6	6	6	6	6	6	6	6.21	7	6	6	6	6	6	7	6	6	6	6	6	6	6	6.14

APPENDIX H

TEAM DEVELOPMENT INVENTORY DATA

TEAM DEVELOPMENT INVENTORY DATA

				Pretest									Postest								
Instructor	Section	Group	Gender	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8	Pretest mean	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8	Posttest Mean
Johnson	M1A	Control	male	6	4	3	6	5	5	6	6	5.13	6	6	5	5	3	5	6	5	5.13
Johnson	M1A	Control	male	6	4	4	5	6	6	6	5	5.25	5	4	5	5	6	6	6	6	5.38
Johnson	M1A	Control	female	4	5	2	3	5	5	4	4	4.00	4	5	3	4	6	6	5	5	4.75
Johnson	M1A	Control	male	6	5	6	7	6	7	6	6	6.13	5	6	5	6	5	7	5	6	5.63
Johnson	M1A	Control	male	6	5	5	6	6	6	2	5	5.13	6	5	6	6	7	5	5	5	5.63
Johnson	M1A	Control	male	3	5	3	5	6	6	5	5	4.75	3	5	4	6	6	6	5	4	4.88
Johnson	M1A	Control	female	6	3	5	5	6	7	3	4	4.88	6	3	6	6	5	6	5	6	5.38
Nason	M2B	Control	male	6	2	1	5	6	5	6	6	4.63	5	5	2	5	7	6	1	5	4.50
Nason	M2B	Control	male	4	6	4	6	6	6	6	6	5.50	4	6	6	6	6	6	3	5	5.25
Nason	M2B	Control	male	3	5	3	3	3	4	4	4	3.63	5	4	5	4	5	5	5	4	4.63
Nason	M2B	Control	male	5	4	5	4	5	5	6	6	5.00	4	3	3	5	3	4	5	5	4.00
Nason	M2B	Control	male	4	2	3	3	6	2	3	2	3.13	4	5	4	5	4	4	4	4	4.25
Nason	M2B	Control	male	6	6	5	4	5	5	5	5	5.13	5	5	5	5	6	6	5	5	5.25
Nason	M2B	Control	female	4	6	5	4	6	5	5	5	5.00	5	6	5	5	7	5	6	5	5.50
Nason	M2B	Control	male	2	4	4	4	4	4	4	4	3.75	5	3	3	3	3	4	3	4	3.50
Nason	M2B	Control	male	4	5	5	6	5	3	6	5	4.88	6	6	3	3	5	2	4	6	4.38
Nason	M2B	Control	female	6	6	6	6	6	6	6	6	6.00	4	4	5	5	3	5	5	2	4.13
Nason	M2B	Control	male	6	5	4	6	6	5	5	6	5.38	5	5	3	6	6	3	4	5	4.63
Nason	M2B	Control	male	6	5	6	6	6	5	6	6	5.75	6	5	6	6	6	5	6	6	5.75
Boyce	M3B	Control	male	5	3	2	3	6	5	4	5	4.13	4	3	3	3	6	4	4	4	3.88
Boyce	M3B	Control	male	5	7	5	6	7	6	6	6	6.00	5	6	6	5	5	6	5	6	5.50
Boyce	M3B	Control	male	6	6	2	3	3	5	5	6	4.50	5	5	4	6	6	6	5	5	5.25
Boyce	M3B	Control	male	4	6	3	3	6	1	5	1	3.63	6	5	3	5	6	3	6	1	4.38
Boyce	M3B	Control	male	6	5	5	5	6	6	5	5	5.38	5	5	3	5	5	6	4	5	4.75
Boyce	M3B	Control	male	4	5	3	5	4	6	6	6	4.88	6	5	5	6	6	7	6	5	5.75
Schwenn	M4A	Control	male	7	6	6	6	6	5	7	6	6.13	7	7	7	7	7	7	7	7	7.00
Schwenn	M4A	Control	male	4	4	3	2	5	6	6	3	4.13	5	4	2	3	3	2	3	4	3.25
Schwenn	M4A	Control	male	5	5	4	4	5	4	5	5	4.63	5	5	3	4	5	5	4	5	4.50
Schwenn	M4A	Control	male	5	6	3	4	6	3	5	4	4.50	3	4	4	4	7	6	5	5	4.75
Schwenn	M4A	Control	male	7	6	6	6	6	5	6	6	6.00	7	6	6	6	6	7	6	7	6.38
Schwenn	M4A	Control	male	3	2	2	5	3	4	3	3	3.13	4	6	2	2	2	3	3	3	3.13
Schwenn	M4A	Control	male	7	6	7	7	7	7	7	5	6.63	7	5	7	7	7	7	7	7	6.75
Schwenn	M4A	Control	male	5	5	6	5	4	5	5	6	5.13	6	6	7	6	5	6	6	7	6.13
Schwenn	M4A	Control	female	7	7	6	6	6	7	7	6	6.50	7	6	6	6	6	7	6	6	6.25
Schwenn	M4A	Control	male	7	6	6	6	6	5	5	6	5.88	6	5	5	5	6	5	6	5	5.38
Schwenn	M4A	Control	female	6	6	5	5	7	5	6	5	5.63	5	6	5	6	6	6	5	5	5.50
Schwenn	M4A	Control	male	5	7	5	6	3	6	2	6	5.00	6	6	5	5	6	5	5	5	5.38
Schwenn	M4A	Control	male	6	4	5	6	7	6	6	5	5.63	6	5	5	5	6	6	5	4	5.25
Schwenn	M4A	Control	male	6	6	6	4	4	4	5	7	5.25	6	6	6	6	6	7	6	7	6.25
Sanders	T4B	Control	female	6	5	6	6	7	6	6	6	6.00	6	5	6	5	6	6	6	6	5.75
Sanders	T4B	Control	male	6	6	5	5	6	5	6	6	5.63	6	6	6	6	6	6	5	6	5.88
Sanders	T4B	Control	male	6	6	4	6	3	5	6	6	5.25	7	6	5	5	6	7	6	6	6.00
Sanders	T4B	Control	male	7	7	7	7	7	6	6	7	6.75	7	6	6	5	6	6	6	5	5.88

				Pretest									Postest								
Instructor	Section	Group	Gender	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8	Pretest mean	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8	Posttest Mean
Sanders	T4B	Control	male	6	6	5	5	7	6	5	5	5.63	5	5	5	5	5	5	5	5	5.00
Sanders	T4B	Control	male	5	6	6	5	7	7	6	5	5.88	6	4	5	4	6	6	5	6	5.25
Sanders	T4B	Control	male	6	6	4	6	5	6	5	6	5.50	7	6	7	7	6	7	6	6	6.50
Gibb	T5A	Control	female	6	6	6	7	6	6	6	7	6.25	6	7	5	5	6	6	5	6	5.75
Gibb	T5A	Control	female	5	3	5	6	7	5	6	7	5.50	6	6	5	5	6	5	3	3	4.88
Gibb	T5A	Control	female	5	3	3	4	5	5	6	6	4.63	5	6	5	6	5	6	6	6	5.63
Gibb	T5A	Control	female	6	6	6	7	6	6	5	7	6.13	7	7	7	7	7	7	7	7	7.00
Gibb	T5A	Control	female	7	7	6	7	6	7	7	7	6.75	7	6	7	6	6	7	6	6	6.38
Hickox	T6A	Control	male	3	2	7	3	5	3	6	7	4.50	5	3	3	5	6	2	1	2	3.38
Hickox	T6A	Control	male	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	6	6	6	6.00
Hickox	T6A	Control	male	6	4	5	4	5	5	3	5	4.63	4	5	5	5	5	5	6	6	5.13
Hickox	T6A	Control	male	6	6	5	5	6	6	6	5	5.63	5	5	5	5	5	5	5	5	5.00
Hickox	T6A	Control	male	5	3	4	3	6	5	5	6	4.63	3	3	4	4	5	4	5	5	4.13
Hickox	T6A	Control	male	5	6	5	6	6	5	6	6	5.63	6	6	5	6	5	6	5	6	5.63
Thul	T7A	Control	male	5	6	5	6	6	5	6	6	5.63	6	7	6	6	7	6	6	6	6.25
Thul	T7A	Control	male	6	6	6	6	6	6	6	6	6.00	6	7	5	5	6	6	7	6	6.00
Thul	T7A	Control	male	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	6	6	6	6.00
Thul	T7A	Control	male	6	7	6	6	7	7	5	5	6.13	7	7	6	5	6	6	7	6	6.25
Thul	T7A	Control	male	7	7	7	6	6	7	7	7	6.75	6	6	7	6	5	6	4	6	5.75
Thul	T7A	Control	male	5	5	5	5	6	6	6	5	5.38	5	5	5	4	7	6	7	6	5.63
Thul	T7A	Control	male	7	7	7	6	7	6	6	7	6.63	6	5	5	6	7	6	6	5	5.75
Thul	T7A	Control	male	6	6	6	6	6	6	6	6	6.00	7	6	6	6	6	6	5	6	6.00
Schwenn	M1B	Experimental	male	6	5	6	7	7	6	6	6	6.13	6	6	5	6	7	7	6	6	6.13
Schwenn	M1B	Experimental	male	5	5	6	5	5	5	6	5	5.25	5	5	5	5	4	5	5	5	4.88
Schwenn	M1B	Experimental	male	6	6	6	7	6	6	6	5	6.00	6	6	6	6	6	6	6	7	6.13
Schwenn	M1B	Experimental	male	5	5	4	5	5	4	5	6	4.88	5	6	5	5	6	5	5	5	5.25
Schwenn	M1B	Experimental	male	6	5	3	3	5	5	5	5	4.63	5	5	5	6	6	5	5	5	5.25
Johnson	M2A	Experimental	male	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	6	6	6	6.00
Johnson	M2A	Experimental	female	6	5	5	5	7	6	6	6	5.75	6	7	6	5	6	6	7	6	6.13
Johnson	M2A	Experimental	male	6	6	5	6	6	7	7	6	6.13	7	7	7	7	6	6	7	7	6.75
Johnson	M2A	Experimental	male	6	5	6	6	5	6	5	5	5.50	6	6	5	6	5	5	6	5	5.50
Johnson	M2A	Experimental	female	5	6	5	4	5	6	6	5	5.25	6	6	6	5	7	7	4	5	5.75
Johnson	M2A	Experimental	male	6	6	5	6	6	5	5	6	5.63	6	7	5	6	7	6	6	6	6.13
Johnson	M2A	Experimental	male	7	7	7	7	7	7	7	7	7.00	6	6	6	6	6	5	6	6	5.88
Johnson	M2A	Experimental	female	5	5	5	5	5	3	3	5	4.50	6	6	6	6	6	6	6	6	6.00
Johnson	M2A	Experimental	male	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	6	6	6	6.00
Nason	M4A	Experimental	male	6	7	5	6	5	6	5	5	5.63	6	7	5	5	6	6	6	6	5.88
Nason	M4A	Experimental	female	6	5	5	6	6	5	6	6	5.63	6	6	6	6	6	6	6	6	6.00
Nason	M4A	Experimental	male	6	6	6	7	6	6	5	6	6.00	6	6	7	7	7	7	7	7	6.75
Nason	M4A	Experimental	male	6	6	5	6	5	5	4	5	5.25	6	5	6	7	6	6	5	7	6.00
Nason	M4A	Experimental	male	5	5	5	5	6	6	6	6	5.50	6	6	5	5	6	6	5	6	5.63
Nason	M4A	Experimental	male	5	5	3	3	6	3	6	3	4.25	6	5	5	6	6	5	5	6	5.50
Nason	M4A	Experimental	male	5	4	4	4	5	5	5	5	4.63	6	5	5	5	5	5	5	5	5.13
Nason	M4A	Experimental	male	6	6	5	5	6	6	5	4	5.38	4	5	4	5	6	4	5	4	4.63
Nason	M4A	Experimental	male	6	5	3	5	6	3	6	5	4.88	5	3	5	3	6	5	5	5	4.63
Nason	M4A	Experimental	male	6	5	6	7	7	5	5	6	5.88	7	6	7	7	7	6	6	7	6.63
Sanders	M6A	Experimental	male	5	6	6	6	7	6	6	6	6.00	6	5	6	5	5	7	6	6	5.75
Sanders	M6A	Experimental	male	6	4	4	6	6	5	6	6	5.38	6	6	6	7	6	6	6	7	6.25
Sanders	M6A	Experimental	male	4	6	5	5	6	6	5	3	5.00	6	7	5	6	6	7	6	7	6.25
Sanders	M6A	Experimental	male	4	5	5	5	5	5	5	5	4.88	5	4	3	4	5	5	4	4	4.25
Sanders	M6A	Experimental	male	6	6	6	6	6	6	6	6	6.00	6	6	6	6	5	6	7	7	6.13
Sanders	M6A	Experimental	male	5	5	6	5	7	6	5	6	5.63	6	7	6	5	7	7	6	5	6.13
Sanders	M7A	Experimental	male	7	5	5	6	6	6	5	5	5.63	6	5	6	6	6	6	6	6	5.88
Sanders	M7A	Experimental	male	5	6	6	5	5	6	5	6	5.50	5	6	6	6	5	6	6	6	5.75
Sanders	M7A	Experimental	male	6	6	5	5	6	6	5	5	5.50	6	6	7	7	6	6	6	6	6.25
Sanders	M7A	Experimental	male	6	6	5	6	7	5	5	5	5.63	6	5	6	6	6	5	6	6	5.75
Sanders	M7A	Experimental	male	7	6	7	6	6	6	6	6	6.25	7	6	7	7	7	7	7	7	6.88

				Pretest									Postest								
Instructor	Section	Group	Gender	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8	Pretest mean	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8	Posttest Mean
Hickox	T2A	Experimental	female	5	6	5	5	5	6	5	5	5.25	5	5	6	6	5	6	5	5	5.38
Hickox	T2A	Experimental	male	5	6	5	6	6	6	6	5	5.63	5	6	5	6	5	6	4	5	5.25
Hickox	T2A	Experimental	male	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	6	6	6	6.00
Hickox	T2A	Experimental	male	5	5	5	5	5	5	6	6	5.25	5	6	6	5	5	6	5	5	5.38
Hickox	T2A	Experimental	male	6	5	6	6	6	5	6	5	5.63	3	5	2	2	6	5	5	3	3.88
Hickox	T2A	Experimental	male	2	6	1	4	5	5	3	1	3.38	5	5	4	4	5	3	3	3	4.00
Hickox	T2A	Experimental	male	5	6	5	5	6	6	6	6	5.63	5	6	6	5	4	5	6	5	5.25
Hickox	T2A	Experimental	male	5	7	5	4	5	5	3	4	4.75	4	6	3	3	5	6	5	3	4.38
Hickox	T5B	Experimental	male	5	5	5	5	5	5	5	5	5.00	5	5	4	5	6	6	5	6	5.25
Hickox	T5B	Experimental	female	6	6	6	6	6	6	6	6	6.00	6	6	6	6	6	6	6	6	6.00
Hickox	T5B	Experimental	male	7	3	6	6	7	6	6	5	5.75	7	6	5	6	7	7	7	6	6.38
Hickox	T5B	Experimental	male	5	6	5	6	6	6	6	5	5.63	7	5	7	7	7	7	7	7	6.75
Hickox	T5B	Experimental	male	5	6	4	4	5	5	5	5	4.88	5	6	4	5	5	5	6	5	5.13
Hickox	T5B	Experimental	male	5	6	5	7	6	6	4	3	5.25	4	5	3	6	6	5	5	5	4.88
Hickox	T5B	Experimental	female	3	5	3	3	3	5	4	3	3.63	6	5	5	5	6	7	5	3	5.25
Hickox	T5B	Experimental	male	5	7	2	3	6	6	5	7	5.13	6	4	2	6	1	2	7	5	4.13
Gibb	T7A	Experimental	male	6	5	6	5	6	4	6	5	5.38	6	5	6	6	5	5	6	5	5.50
Gibb	T7A	Experimental	female	6	4	5	6	6	6	6	6	5.63	6	6	5	7	7	7	5	6	6.13
Gibb	T7A	Experimental	male	6	5	3	5	7	6	6	6	5.50	5	6	5	6	7	7	6	7	6.13
Gibb	T7A	Experimental	female	5	7	2	2	7	6	4	6	4.88	6	7	3	4	7	7	1	5	5.00
Gibb	T7A	Experimental	male	6	5	5	5	5	6	5	5	5.25	5	5	5	5	3	5	5	5	4.75

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