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Andrews University

School of Education

THE EFFECTS OF COOPERATIVE LEARNING VERSUS TRADITIONAL
CLASSROOM INSTRUCTION ON COGNITIVE ACHIEVEMENT,
CRITICAL THINKING, AND ATTITUDES TOWARD
LEARNING IN TEAMS IN A PHYSICIAN
ASSISTANT PROGRAM

A Dissertation

Presented in Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

by

Scott L. Massey

March 2003

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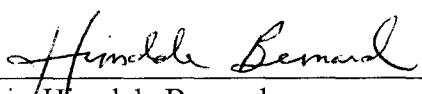
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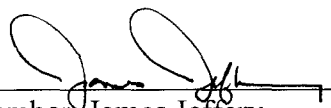
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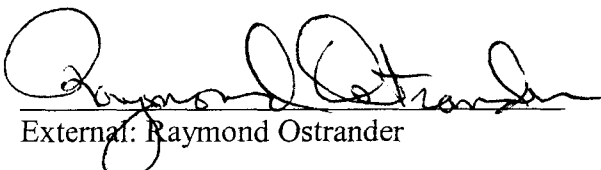
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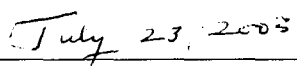

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ABSTRACT

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ABSTRACT OF GRADUATE STUDENT RESEARCH

Dissertation

Andrews University

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Date completed: March 2003

Problem

Physician assistants are required to possess critical thinking skills and excellent intellectual skills to achieve the level of autonomy expected by supervising physicians. No scientific research has been identified to determine the most effective means of educating the physician assistant students.

The purpose of the research study was to determine whether a statistical difference exists between students educated in a cooperative learning environment versus a traditional lecture environment. The dependent variable utilized in this study included critical thinking skills, cognitive achievement, and attitudes towards learning in teams.

Using an experimental research design, students were educated in a cooperative

learning format versus a traditional lecture format. The findings revealed no statistically significant difference in cognitive achievement and critical thinking scores between the cooperative learning section and the lecture section.

The instrument utilized to measure attitudes toward learning in teams was divided into nine sub-hypotheses. In six of the nine sub-hypotheses, the null hypotheses were retained. Three of the subhypotheses revealed statistically significant differences between the two groups on the following items: all members of my group were integral to the group's success, each member of my group contributed to the effectiveness of our presentation and success of the group, and my group knew the goal of the group and understood its importance. Although the research findings in this study were not consistent with the cooperative learning literature at the elementary and secondary levels, the findings were consistent with an eariler dissertation completed in 1984 at the college level.

To Jesus Christ

For Restoring My Life,

To My Mother Who Always
Believed In Me Despite My Failings,

To My Son James,
The Light Of My Life,

To The PA Faculty
For Their Patience And Understanding,

To Tom Hill
For His Assistance,

And To Patty Linder
For Her Love, Support, And Friendship.

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CHAPTER ONE

INTRODUCTION

Background to the Problem

As health care practitioners, physician assistants (PAs) work as essential members in interdisciplinary teams. Physician assistants practice medicine under the supervision of licensed physicians. PAs consult with their supervising physician when problems are encountered beyond the scope of their training. To exemplify the level of PA professional responsibility, the American Academy of Physician Assistants has developed a working definition of a physician assistant (2001).

Physician assistants are health professionals licensed or, in the case of those employed by the federal government, credentialed, to practice medicine with physician supervision. Physician assistants are qualified by graduation from an accredited physician assistant educational program and/or certification by the National Commission on Certification of Physician Assistants. Within the Physician/PA relationship, physician assistants exercise autonomy in medical decision-making and provide a broad range of diagnostic and therapeutic services. The clinical role of physician assistants includes primary and specialty care in medical and surgical practice settings in rural and urban areas. Physician assistant practice is centered on patient care and may include educational, research, and administrative activities. (p. 6)

PAs are required to possess critical thinking skills, highly developed interpersonal skills, and excellent intellectual skills to achieve this level of functioning.

The educational process of the PA is delivered in a traditional lecture-based format. Although some PA programs and medical schools have transitioned to a

problem-based format, most education today is still delivered in the traditional lecture-based format. This produces an educational paradox, as the role of the PA in clinical practice is vastly different from that practiced in the classroom. In the lecture-based format, the teacher is viewed as a transmitter of knowledge. Reinsmith (1994) stated, “The teacher as transmitter by its very name assumes the greatest distance between the teacher and learner. This is hardly a teaching presence at all” (p. 4). Sitler (1997) stated that lecture encourages student passivity and negates students’ own ability to think and make meaning of material (p. 3). This contrasts with the learning environment on clinical rotations and in clinical practice; the PA is required to actively and rapidly evaluate, analyze, and synthesize information. This requires students to rapidly develop advanced intellectual skills.

To interact with patients and function as an effective member of a health care team, highly developed critical thinking and interpersonal skills are required. Cooperative learning provides an alternative learning environment in which students learn in groups and are given the opportunity to participate in an educational environment more conducive to developing the skills necessary to become critical thinkers. Cooperative learning has been used in primary, secondary, and higher education and has been shown to enhance critical thinking skills and academic achievement in numerous studies (Johnson, Johnson, & Stanne, 2000).

Statement of the Problem

No scientific research has been identified to determine the most optimal pedagogic technique to educate physician assistant students. An exhaustive literature

search failed to identify any scientific studies involving pedagogy in PA education.

Purpose of the Study

This research study assessed whether a statistically significant difference exists between traditional lecture methodology and cooperative learning for preparing physician assistants using the following dependent variables: critical thinking skills, cognitive achievement, and attitudes toward learning in teams.

Research Questions

The research questions investigated in this study are as follows:

1. Is there a statistically significant difference in critical thinking skills between PAs educated in a traditional lecture format versus a cooperative learning format?
2. Is there a statistically significant difference in cognitive achievement between PAs educated in a traditional lecture format versus a cooperative learning format?
3. Is there a statistically significant difference in attitudes toward team learning between PAs educated in a traditional lecture format versus a cooperative learning format?
4. Are there statistically significant gender, method of instruction, and academic program main effects on the cognitive achievement of physician assistant students as measured by the cognitive course exams?
5. Are there statistically significant two-way interactions between gender, method of instruction, and academic programs on cognitive achievement of physician assistant students as measured by the cognitive course exams?

Rationale for the Study

It was important to determine if there is any distinction between cooperative learning and traditional lecture methods in physician assistant preparation. This knowledge could impact future trends in the pedagogic preparation of the physician assistant.

Importance of the Study

This study was designed to research the effects of cooperative learning and traditional classroom instruction on academic achievement, critical thinking skills, and attitudes toward team learning in a physician assistant program. Why are these variables important to study and measure in physician assistant education? In the Accreditation Standards for Physician Assistant Education written by the Accreditation Review Commission on Education for the Physician Assistant (2001), these attributes are considered essential to practice as a physician assistant.

Standard B5.5 states, “Programs must assist students in becoming critical thinkers who can apply the concepts of medical decision-making and problem solving” (p. 13). Also, standard B3.7 states, “Programs must provide instruction in effective interpersonal communication” (p. 12) and standard B7.3 asks that programs “provide instruction on the physician/PA team relationship” (p. 13). Finally, standard B5.9 states, “Programs must provide instruction that stresses the examination of evidence from clinical research as a basis for clinical decision making” (p. 13).

These standards emphasize the importance of developing the attributes being studied in this research such as critical thinking, cognitive achievement, and attitudes

toward learning in teams. These skills must be developed for physician assistants to be competent clinicians. Physician assistants, as these and other standards indicate, assume significant responsibility in the delivery of health care; therefore, it is imperative that the most efficient and effective means of educating the PA student be employed to assure the acquisition of these competencies.

No scientific research has been identified to determine the most effective means of educating the physician assistant student. The lack of literature regarding this topic has led to this research study. This study determined if there is a difference in outcomes between the traditional lecture method and cooperative learning.

Definitions of Terms

The following conceptual definitions are given in order to clarify the meaning of the terms:

1. *Accreditation Review Commission on Education for the Physician Assistant*: Is responsible for establishing, maintaining, and promoting appropriate standards of quality for physician assistant training programs and providing recognition for programs that meet or exceed the standards of an accredited program.

2. *American Academy of Physician Assistants*: The professional association of physician assistants.

3. *Attitudinal Survey Toward Team Learning*. An instrument that was administered to both the cooperative learning section and the lecture section as a post-assessment instrument to compare and measure attitudes toward learning in teams.

4. *Cognitive Exams*: A 100-point multiple-choice exam that was administered to

both the cooperative learning and the lecture sections of PHAS 220 Principles of Medicine I. These exams were used to measure cognitive achievement.

5. *Cooperative Learning*: The instructional use of small groups allowing students to work together to maximize their own and each other's learning.

6. *Critical Thinking Proficiency*: Reasonable reflective thinking that is focused on what to think or do. It requires an ability to recognize problems, gather pertinent information, interpret data, appraise evidence, and to evaluate lines of thinking, points of view, and personal insights that might contribute to the framing of logical, effective, reality-based action (Duchesne, 1995). The degree of critical thinking proficiency will be measured by the student's score on the Watson-Glaser Critical Thinking Appraisal.

7. *Lecture*: An extended presentation in which the instructor presents factual information in an organized and logically sequenced approach.

8. *Physician Assistants*: Health professionals licensed or, in the case of those employed by the Federal Government, credentialed to practice medicine with physician supervision.

9. *Physician Assistant Student*: An individual enrolled in a physician assistant program accredited by the Accreditation Review Commission on education for the Physician Assistant (ARC-PA).

10. *Principles of Medicine I (PHAS 203)*: A course utilized in the study that teaches clinical decision making and emphasizes the etiology, clinical manifestation, pathophysiology, and management of basic disease processes.

Assumptions

The study is based upon the assumption that each group, in either the cooperative or lecture section, possessed a comparably equal range of abilities. I assumed that students took the administration of the Watson-Glaser Critical Thinking Appraisal with the comparable seriousness and diligence. I assumed that the fact that the students were not aware of the study when registration occurred, prevented students who had previous experience with cooperative learning from preferentially selecting the cooperative section.

Limitations of the Study

First, a single measurement of critical thinking proficiency was utilized as a pre- and post-assessment tool in this study. This could lead to limited generalizability, as only a one-semester class was measured. It is possible that gains on the Critical Thinking Appraisal could be attributed to normal maturation. The study focused on strengthening internal validity through an experimental design using the two pedagogic approaches.

Second, cognitive achievement was measured through four, 100-point exams. This provided limited information for a basis of comparison regarding cognitive achievement. Third, the survey instrument that measures attitudes toward team learning has only nine questions to measure attitudes. Fourth, the sample size was relatively small: 30 students in the cooperative learning section and 25 students in the lecture section. Finally, the study could have very limited external validity as a very specific population was being studied.

Overview of the Research Design

A one-semester course, Principles of Medicine I (PHAS 220), at Kettering College of Medical Arts Physician Assistant Program, was utilized in the study. A class size of 55 students registered for either the quasi-experimental group or control group. After registration the students were informed about the study. One section employed the traditional lecture format and the other section employed a combination of short summarized lectures followed by cooperative learning exercises.

The cooperative learning method used in the study is called “learning together” (Johnson & Johnson, 1977). The students in the cooperative learning section were trained in cooperative learning techniques. The cooperative learning section received the same material distributed to the lecture section, but processed the information in structured group exercises completing clinically oriented case studies. The cooperative learning group was given group incentives as part of ensuring that proper cooperative techniques were conducted.

The dependent variables used in the quasi-experimental (cooperative) and control (lecture) sections included a pre- and post-administration of the Watson Glaser Critical Thinking Appraisal. A post-administration of the Attitudinal Survey regarding learning in teams was administered to the experimental and control groups. The experimental and control groups received the same cognitive exams. The exams were administered to both groups on the same day.

Outline of the Remainder of the Dissertation

Chapter 2 includes the related literature used as a background for the study.

Chapter 3 presents the procedures and methodology of the study.

Chapter 4 presents the analysis of the data.

Chapter 5 presents the summary, discussion, conclusions, and recommendations for future research.

CHAPTER TWO

REVIEW OF THE LITERATURE

Theoretical Framework Supporting Cooperative Learning

The results of the literature search in the field of cooperative learning revealed extensive scientific research validating the effectiveness of this educational methodology. Research exists from the elementary school to the college level. In this section, the theoretical underpinnings of cooperative learning are discussed. There will be some repetition discussing the major theorists in this field in the section entitled History of Cooperative Learning. It was necessary to separate these sections to enhance understanding.

The use of cooperative learning has its roots in the creation of social interdependence, cognitive-developmental, and behavioral learning theories (Johnson & Johnson, 1998). “Some of the greatest theorists of the 20th century have focused on cooperation. Social interdependence views cooperation as resulting from positive interdependence among individual goals” (Johnson, Johnson, & Stanne, 2000, p. 2).

Kurt Koffka, one of the founders of the Gestalt School of Psychology, proposed in the early 1900s that groups were dynamic wholes in which interdependence could vary (Johnson & Johnson, 1998). Kurt Lewin (1935) stated, “The essence of a group lies in the interdependence of its members and those groups are dynamic wholes in which a

change in the state of any member or subgroup changes the state of other members or subgroups” (p. 2). Deutsch (1962), one of Lewin’s students who first formulated the social interdependence theory in the 1940s, noted that interdependence could be positive (cooperation), negative (competition), or nonexistent (effects individualized). Johnson and Johnson published a comprehensive formulation of the social interdependence theory in the 1980s. The basic premise of this theory is that social interdependence influences outcomes. Positive interdependence (cooperation) results in promotive interaction. Negative interdependence (competition) typically results in oppositional interaction. Where there is no interaction, individualism, students work as individuals and work independently without exchange from each other. (1998, p. 2)

In 1987, Johnson and Johnson published the following “twelve Lewinian principles of experiential learning”:

Principle 1: Effective experiential learning will affect the learner’s cognitive structures (action theories), attitudes and values, perceptions and behavioral patterns.

Principle 2: People will believe more in knowledge they have discovered themselves than in knowledge presented by others.

Principle 3: Learning is more effective when it is an active rather than a passive process.

Principle 4: Acceptance of new action theories, attitudes, and behavioral patterns cannot be brought about by a piecemeal approach - one’s whole cognitive-affective-behavioral system has to change.

Principle 5: It takes more than information to change action theories, attitudes, and behavioral patterns.

Principle 6: It takes more than firsthand experience to generate valid knowledge. Besides experience, there needs to be a theoretical system that the experience tests out, and reflection on the meaning of the experience.

Principle 7: Behavior changes will be temporary unless the action theories and attitudes underlying them are changed.

Principle 8: Changes in perceptions of oneself and one’s social environment are necessary before changes in action theories, attitudes, and behavior will take place.

Principle 9: The more supportive, accepting, and caring the social environment,

the freer a person is to experiment with new behaviors, attitudes, and action theories.

Principle 10: In order for changes in behavior patterns, attitudes and action theories to be permanent, both the person and the social environment have to change.

Principle 11: It is easier to change a person's action theories, attitudes, and behavioral patterns in a group context than in an individual context.

Principle 12: A person accepts a new system of action theories, attitudes, and behavioral patterns when he or she accepts membership in a new group. (p. 18)

In addition to Lewin, Deutsch, Johnson, and Johnson, there are widespread educational and cognitive behavioral researchers who have validated the successful nature of its pedagogical framework. The theorists who have studied cooperative learning are described in Johnson and Johnson (2000), and the fields of anthropology (Meade, 1936), sociology (Coleman, 1961), economics (Van Mises, 1949), political science (Smith, 1959). In the field of psychology, cooperative learning has been studied most extensively. These scientists include Deutsch in 1949 and 1962, Johnson and Johnson in 1979 and 1989, Piaget in 1950, Vygotsky in 1978, Bandura in 1977, and Skinner in 1968 (Johnson & Johnson, 2000, p. 2).

The cognitive developmental perspective is largely based on the theories of Piaget and Vygotsky. The work of Piaget and related theorists is based upon the premise that when individuals cooperate, a socio-cognitive conflict occurs that creates cognitive disequilibria, which in turn stimulates perspective-taking ability and cognitive development (Johnson & Johnson, 1998). The work of Vygotsky and related theorists is based on this premise:

Knowledge is social, constructed from cooperative efforts to learn, understand, and solve problems. The behavioral theory perspective focuses on the impact of group reinforcement and rewards on learning. Skinner focused on group contingencies. Bandura focused on limitation and Skinner on group contingencies. (Johnson & Johnson, 1998, p. 2)

As discussed in this section, a considerable theoretical foundation that supports cooperative learning exists. In the next section, entitled History of Cooperative Learning, a more complete chronological description is summarized. Does cooperative learning work? Johnson, et al. (2000) conducted the most comprehensive meta-analysis of cooperative learning research at the University of Minnesota. The meta-analysis found over 900 research studies validating the effectiveness of cooperation over competitive and individualist efforts (Johnson et al., 2000).

The History of Cooperative Learning

The history of learning together in groups or dyads dates back thousands of years.

Johnson and Johnson (2001a) state:

Socrates taught students in small groups engaging them in his famous art of discourse. As early as the first century Quintillion argued that students could benefit from teaching each other. Johann Amos Comenius (1592-1679) believed that students could benefit both by teaching and being taught by other students. (p. 6)

In Colonial America, cooperative learning was further developed. “Benjamin Franklin organized learning groups to gain an education. Within the common school movement in the United States in the early 1800s, there was a strong emphasis on cooperative learning” (Johnson & Johnson, 2001b, p. 7). From 1875 through 1880 Colonel Francis Parker, a school superintendent, introduced the idea of cooperative learning in Quincy, Massachusetts (Nielsen, 1994).

In 1929, Maller investigated cooperation versus competition and determined that cooperation was more efficient among group members who were similar in age, intelligence, and social factors (Myers, 1996, p. 1). John Dewey promoted the use of

cooperative learning groups as part of his famous project method in instruction (Dewey, 1916).

Social Psychologist, Kurt Lewin, working with Max Wertheimer, the founder of Gestalt Psychology, helped develop the Principles of Gestalt Psychology. Lewin's (1935) theory of motivation predicted that a state of internal tension in an individual caused the individual to move toward a goal. In addition, when that person has a goal he or she also has an idea of how to obtain the goal. (Smith, 1984, p. 2)

In the 1940s, Morton Deutsch, building on the theorizing of Kurt Lewin, “proposed a theory of cooperative and competitive situations that has served as the primary foundation on which subsequent research and discussion has been based” (Johnson & Johnson, 1989, p. 5). In 1949 Morton Deutsch published his landmark study comparing cooperative and competitive learning in a college psychology class at the Massachusetts Institute of Technology. Then, in 1952 Haines replicated the study at University of Michigan (Johnson & Johnson, 2001b, p. 1).

Sherman (1996) provided a succinct overview of the generations of theorists since Lewin who have produced the foundational research of cooperative learning. A student of Deutsch, David Johnson went on to develop the theory of cooperative conflict. Another student of Lewin, L. Festinger, mentored E. Aronson who went on to develop the landmark jigsaw technique. Other theorists during this period included Slavin who developed several cooperative techniques including Jigsaw II. It was through this generation of students that the seminal works defining cooperative learning were written. The different approaches will be defined in the section General Characteristics of Cooperative Learning.

Johnson and Johnson began their work on cooperative learning in the 1960s,

resulting in the formation of the Cooperative Learning Center at the University of Minnesota in the early 1970s (Johnson & Johnson, 2000, p. 5). It was from this center that the most prolific research on writing on cooperative learning occurred in the 1970s and 1980s. The Johnsons also conducted several meta-analyses of the research conducted on cooperative learning. The most comprehensive was completed in May 2000 at the University of Minnesota. This will be discussed in more depth under the sections in Cooperative Learning at the College Level.

In summary, cooperative learning has existed for thousands of years. In the American education system, considerable interest was generated by Parker in the 1880s, but interest waned until Dewey's work in the 1930s. Deutsch built upon the theories of Dewey and Kurt Lewin who were two of the founders of Gestalt Psychology. Deutsch conducted his landmark study at Massachusetts Institute of Technology in the 1940s.

From Deutsch emerged a generation of scholars, including the Johnsons, who continue to develop the theoretical framework of cooperative learning. In later sections of the literature review, more specifics on different techniques and approaches of cooperative learning are discussed. This will include the approach I utilized in the experimental study described in chapter 3 of this dissertation.

General Characteristics of Cooperative Learning

In this section, I discuss the general definition and characteristics of cooperative learning. More specific discussion of actual cooperative learning approaches is outlined in the section titled The Use of Cooperative Learning as a Pedagogic Tool. As described in the Educational Research Service report (1990), cooperative learning is defined and

described as follows:

Cooperative learning is the instructional use of small groups so that students work together to maximize their own and each others learning. Considerable research demonstrates that cooperative learning produces higher achievement, more positive relationships among students, and healthier psychological adjustment than do competitive or individualist experiences. (p. 5)

In a seminal paper written by Deutsch (1962), the general characteristics of cooperative learning were identified as three 'goal structures' which describe how people learn cooperatively, competitively, and individually. Johnson and Johnson (1987) distinguished these structures in the following ways: In cooperation, "we sink or swim together." A group attains its goal only if all members attain the goal. In this situation, there is a positive correlation among goal attainments, and the goal is beneficial to all group members. In competition, "I swim, you sink; I sink, you swim." An individual attains his or her goal at the expense of other class members. In the competitive goal structure, a negative correlation exists among goal attainments. One person gains at another's loss. The outcome is beneficial to only a few and grading is usually on a curve (norm referenced). In individualization, "we are each in this alone." An individual attaining his or her goal is unrelated to any other students attaining their goals. There is a fixed set of standards for which all students strive.

As described in the Educational Research Service report (1990), "there are common elements of cooperative learning methods. Although all cooperative learning methods require students to perform highly structured group tasks there are significant differences among the various methods. All methods share the following characteristics" (p. 8):

1. Classes are divided into small groups with two to six members.

2. Groups have an interdependent structure with high individual accountability.
3. Clearly defined objectives are specified for the groups.
4. A cooperative environment and a reward system are present within the groups.
5. Students support each other's efforts to achieve.
6. There is monitoring of group members' behaviors.

Many teachers believe that simply placing students in a group creates the environment of cooperative learning. Although this may enhance learning, working together does not constitute true cooperative learning. The Educational Research Service report (1990) succinctly described what qualifies as a cooperative group.

To be cooperative, a group must have clear positive interdependence and members must promote each other's learning and success face to face, hold each other personally and individually accountable to do his or her fair share of the work, use appropriately the interpersonal and small-group skills needed for cooperative efforts to be successful, and process as a group how effectively members are working together. These five essential components must be present for small-group learning to be truly cooperative (p. 6).

In cooperative learning literature, writers often address the altered role of the teacher in cooperative learning rather than being the sage on the stage. The teacher becomes the guide on the side (Johnson, Johnson, & Holubec, 1994).

The section of the literature review chapter titled Cooperative Learning as a Pedagogic Tool will discuss this concept in more depth. This concept often presents a struggle as the true challenge of cooperative learning is not to cover the content or material, but to uncover the material with the students (Johnson et al., 1994).

The teacher has a six-part role in formal cooperative learning (Johnson & Johnson, 1994; Johnson et al., 1993).

1. Specifying the objectives for the lesson
2. Making pre-instructional decisions about learning groups, room arrangement, instructional materials, and students' roles within the groups
3. Explaining the task and goal structure to the students
4. Setting the cooperative lesson in motion
5. Monitoring the effectiveness of the cooperative learning groups and intervening as necessary
6. Evaluating students' achievement and helping them discuss how well they collaborated with each other (p. 37).

This section has provided some key points about the fundamental aspects of what defines cooperative learning. The differences between cooperative, competitive, and individualistic learning were contrasted. Also discussed were the basic elements of how to implement cooperative learning in the classroom. In the upcoming sections, more specific elements of cooperative learning at different education levels are summarized, followed by discussion of pedagogic techniques. The conclusion of chapter 2 discusses cooperative learning and specific outcomes such as critical thinking, cognitive achievement, and affective outcomes.

Cooperative Learning in Colleges and Universities

At the college level, there has been some research with empirical data demonstrating the advantages of cooperative learning. The best estimate of the

prevalence of cooperative learning at the college level was studied by Johnson et al., (2000). In the latest comprehensive meta-analysis, the study found that 24% of the experimental studies performed were at the college level. Slavin (1990) stated that the research results are not as consistent as those from elementary and secondary schools.

A study by Dansercau (1983) involved over 200 college students attempting to master and retain information from a science text. Results indicated that pairs of students consistently perform better than students working alone. Treisman (1985) found that Black students enrolled in a mathematics collaborative learning enrichment program scored significantly higher in freshman calculus, graduated in math-based majors four times more often, and had significantly lower attrition rates than comparable students not enrolled in the program. Frierson (1986) found that 139 Black nursing students, when studying in cooperative learning groups, scored higher on a state board exam than a similar group studying by more conventional methods.

Johnson, Johnson, and Smith (1998) wrote about research of cooperative learning at the college and university level. The article also discussed the inherent difficulty of creating true cooperative learning:

In contrast to competitive and individualistic learning students can work together cooperatively to accomplish shared learning goals. Each student achieves his or her learning goal if and only if the other group member achieves his or her goals. When all group members reach criteria each member may receive bonus points.
(p. 2)

In a meta-analysis of studies conducted in college and adult settings, Johnson et al. (1998) found the following: Between 1924 and 1997 over 168 studies were conducted comparing the relative efficiency and cooperative, competitive efficacy of cooperative, competitive, and individualistic learning on the achievement of individuals 18 years or

older. These studies indicate that cooperative learning promotes higher individual achievement than do competitive approaches (effect size = 0.49) or individualistic ones (effect size = 0.53). Effect sizes of this order describe significant substantial increases in achievement. They mean, for example, that college students who would score at the 50th percentile when learning competitively will score in the 69th percentile when learning cooperatively; students who would score at the 53rd percentile level when learning individually will score at the 70th percentile when learning cooperatively.

Not all studies have shown consistently higher achievement when comparing cooperative and individualistic goal structures on achievement, affective outcomes, and group process skills. Smith (1984) conducted a dissertation study comparing these variables with cooperative and individualistic learning methodologies. The study revealed no significant difference between treatment groups in achievement, attitudes, or verbal interaction. One significant finding of this study was that students who worked in small groups of three to four – whether in a cooperative or individualistic setting – talked five times more often than students in the teacher-led individualistic groups.

Some of the other researchers in the field of cooperative learning have a positive, yet cautious, attitude about the results (Slavin, 1989, 1990). Although a bit more cautious in his endorsement of cooperative learning, generally he concurs by claiming that in terms of achievement, cooperative learning techniques are no worse than traditional ones. He adds that cooperative methods certainly have positive effects on a wide area of affective outcomes. Affective outcomes will be discussed later in the literature review.

In a study involving 106 students in six sections of a Statistics course, it was found that students working in small groups performed better than those in a traditional

setting. A similar study was done by Rah and Heyl (1990) involving 258 students in five graduate and undergraduate Sociology classes. Those in cooperative (collaborative) learning groups performed significantly better on tests in three of the four semesters of the study.

Cooper (1988) concluded a 3-year study on 46 different college-level classes essentially covering the entire curriculum. He maintained the superiority of cooperative learning over the traditional lecture method, claiming particular success with low-achieving students, minorities, and women. In the literature review section, I took a generic approach to describing the literature in higher education. A comprehensive literature search found thousands of citations on cooperative learning, and dissertation abstracts provided several dissertations that were very similar to the research design this dissertation utilized. Unfortunately, there was no literature on cooperative learning research of publications involving physician assistant education. This created a sense of charting new territory.

Cooperative Learning in Allied Health and Physician Assistant Education

One of the compelling reasons for choosing cooperative learning in PA education is that an exhaustive literature search failed to find any scientific studies on cooperative learning in PA education. A search using UMI Proquest Digital Dissertations revealed 86 dissertations related to the field of PA education. None were written about pedagogic techniques or research on the educational process involving PA students.

A research study involving education abstracts revealed no cooperative learning studies. A search using the Cumulative Index To Nursing and Allied Health Literature

(CINAHL) did reveal some studies described in the upcoming pages. An ERIC search found references about problem-based learning and collaboration but no reference regarding cooperative learning in allied health education.

Psyc INFO was searched from 1967 through the present and revealed 200 related records. These were searched for relevance to this research study. There were numerous references to problem-based learning but no scientific studies on cooperative learning in allied health education. The summary of the literature search reinforces the statement of the problem: There is currently no scientific research being conducted to determine the most optimal pedagogic techniques to educate physician assistant students more specifically. No scientific research on cooperative learning has been attempted in PA education.

One study was found from the cumulative index to nursing and allied health literature data banks (CINAHL). Lynch (1984) conducted a study utilizing cooperative learning in interdisciplinary education for the allied health professions. This study utilized community health, medical technology, physical therapy, physician assistant, and allied health education teachers. These students were enrolled in a required interdisciplinary course at the University of Kentucky. The Lynch study examined the effects of group consensus examinations of the perceptions and achievement of allied health students in an interdisciplinary course. The results indicated that, when compared to the traditional individual mode of testing, group consensus examination had a significant positive effect on the perceptions of students regarding the clarity and importance of course topics. Achievement on the quizzes was higher and although, no difference was found between the two treatment groups on final examination scores,

student performance was superior to that of previous years. A large majority of students indicated they preferred group consensus examinations in this type of course.

Although the literature search did reveal numerous citations to problem-based learning, I chose to omit these due to the differences in pedagogic techniques between cooperative learning and problem-based learning.

The Use of Cooperative Learning as a Pedagogic Tool

In this section various approaches to cooperative learning are discussed. In addition, I compare the effects of cooperative learning versus traditional lecture; some of the literature on the lecture approach to education are included.

In addition, the major cooperative learning techniques in an outline of the major differences between the eight major approaches will be discussed, followed by a discussion of the lecture approach.

As described in the Educational Research Service report (1990), there are eight major types of cooperative learning methods and strategies. "Since the particular methods vary in their degree of effectiveness for different grade levels and for different subject matter selections of an appropriate method is a major factor in determining the impact of cooperative learning" (p. 5). The method chosen for this study is called learning together.

Major Cooperative Learning Methods

In this section, I will list and describe the major cooperative learning methods in the literature.

1. Student Teams Achievement Divisions (STAD)

2. Team Game Tournaments (TGT)
3. Teams Assisted Individualization (TAI)
4. Jigsaw
5. Jigsaw II
6. Cooperative Interpreted Read and Composition (CIRC)
7. Learning Together
8. Group Investigation (Education Research Service, 1990, p. 9).

Education Research Service (1990) provides a brief description of each of the eight cooperative learning approaches.

1. Student Team Achievement Division (STAD): The STAD method developed by Robert Slavin combines a group study task structure with a cooperative incentive structure in which students receive a group reward for individual learning (p. 2).

2. Team Game Tournament (TGT): The TGT method developed by Robert Slavin and Edward DeVries uses a group study task structure with a cooperative incentive structure in which students receive a group reward for individual learning. TGT, like STAD, is designed for use in teaching material with one right answer such as mathematics, science, and social studies (p. 11).

3. Team Assisted Individualization: This method developed by Robert Slavin, Marshall Leavey, and Nancy Madden uses a group study task structure with a cooperative incentive structure in which students receive a group reward for individual learning. The TAI method differs from the other methods in that it was designed to be used in Grades 2-8 for Mathematics (Educational Research Service, 1990, p. 12).

4. Jigsaw: Developed by Elliot Arnason, Jigsaw uses a task specialization task

structure and an individual incentive structure. This method of cooperative learning was designed for material that comes from reading such as Literature, Social Studies, or Science in Grades 3-12 (p. 13).

5. Jigsaw II: The variation on the original Jigsaw, Jigsaw II was developed by Robert Slavin. Jigsaw II can be used under the same circumstances for a subject and grade as the original Jigsaw. The difference between Jigsaw and Jigsaw II is that Jigsaw II uses a cooperative structure in which students receive a group reward for individual learning (p. 13-14).

6. Cooperative Integrated Reading and Composition (CIRC): This method developed by Robert J. Stevens, Nancy Madden, Robert Slavin, and Anna Marie Farnish uses a group study task structure with a cooperative incentive structure in which students receive a group reward for individual learning. This method was designed for teaching Reading, Composition, and Languages (p. 14).

7. Learning Together: This method developed by David Johnson and Roger Johnson uses a group study task structure with a cooperative incentive structure in which students receive a group reward for a group product. Learning together involves the highest degree of cooperation between students and can be used for most subjects. This method involves a whole class instruction. Assignment sheets are completed cooperatively by the group and handed in as a group product. Students receive rewards based upon the whole group (p. 15).

8. Group Investigation: This method developed by Shlomo Sharan uses a task specialization structure with a cooperative incentive structure in which students receive a group reward for a group product. This method is useful in most subjects and designed to

encourage creative thinking with group and self-organization (p. 15).

The Lecture Approach to Teaching

After describing different methodologies of cooperative learning, it is time to discuss the Pedagogic Technique being compared in the study, the Lecture. The Education Research Service series stated, “Our survey of teaching methods suggests that if we want students to become more effective in meaningful learning and thinking they need to spend more time in active meaningful learning and thinking - not just sitting and passively receiving information” (McKenzie, 1986, p. 77).

“In a teacher centered class the teacher speaks 80% of the time; thus, it is estimated that in this typical classroom with 30 students in a class each student speaks 30 seconds each one hour class period long” (Long, 1985, p. 34).

Most college students have grown up in a system that emphasized the lecture method. With the exception of lab class, I did not encounter any cooperative learning until graduate school. This has led me to examine the pros and cons of lecture and define what is meant by the concept of the sage on the stage.

What exactly is lecturing? By definition a lecture is an extended presentation in which the instructor presents factual information in an organized and logically sequenced way. It typically results in long periods of uninterrupted teacher centered expository discourse that relegates students the role of passive spectacles in the college classroom. (Educational Research Service, 1990, p. 99)

The rationale for and pedagogy of lecturing are based on theories of the structure and organization of knowledge, the psychology of meaningful verbal learning, and ideas from cognitive psychology associated with the representation and acquisition of knowledge (Bruner, 1960).

Research on lecturing has concluded that this approach to teaching has five

primary functions (see Bligh, 1972; Costin, 1972; Eble, 1983; McKeachie, 1967; Verren & Dickerson, 1967). These studies concluded that lecture is appropriate when the purpose is to:

1. Disseminate information
2. Present material that is not available elsewhere
3. Expose students to content in a brief time that might take longer to locate on their own
4. Arouse students' interest in a subject
5. Teach students who are primarily auditory learners.

Obviously, there are positive attributes to giving lectures, but what are the limitations of the lecture approach? Research during the 1960s by D.H. Lloyd at the University of Reading in Berkshire, England, found that attention spans lasted 5 minutes, then sharply dropped off (Penner, 1984). Concentration during lectures of medical students who presumably are highly motivated rose sharply, peaked 10 to 15 minutes after the lecture began, then steadily decreased (Stuart & Rutherford, 1978).

What type of learning do lectures promote? Lecturing tends to promote only low-level learning of factual information. An extensive series of studies concluded that while lecturing was as (but not more) effective in reading or other methods in transmitting information, lecture was clearly less effective in promoting thinking or in changing attitudes (Bligh, 1972).

Research on the role of lecture in 1,500 undergraduate students integrated with problem-based learning revealed that lecture quality did not affect the time spent in study or enhance achievement (Van Berkel, Henk, & Schmidt, 2001). Reinsmith (1994) wrote

about teacher-centered teaching and describe the disseminator form of teaching. This approach is described as the memorize-regurgitate method of learning which means that learning will take place on a most superficial level. This is what Matron and others have called surface level processing.

If the studies on lecturing are separated according to whether they focused on factual learning, higher level reasoning, attitudes, motivation, or lectures are found to be superior to discussion to promote factual information but inferior to discussions for promoting higher level reasoning skills, positive attitudes, and motivation to learn (McKeachie & Kerlik, 1975).

One last point raised by Johnson, Johnson, and Smith (1991) is that “if material is complex, detailed or abstract, when students need to analyze, synthesize or interpret the knowledge being studied, lecturing is not a good idea. Factual cooperative learning should be used to accomplish short goals” (p. 103).

The remainder of chapter 2 focuses on specific attributes of cooperative learning such as cognitive achievement, affective benefits, and critical thinking enhancement.

Cooperative Learning and Critical Thinking

The question must be asked: “Does cooperative learning promote critical thinking skills?” Promotion of critical thinking is one of the most important attributes that led me to study cooperative learning in Physician Assistant education. Physician Assistants must work in a team format, synthesize and analyze medical information, and formulate clinical diagnosis. This involves critical thinking at a very high level. In Bloom’s taxonomy this constitutes the three highest levels of learning: analysis, synthesis, and

evaluation (Bloom, 1956).

According to Vygotsky (1978), students are capable of performing at higher intellectual levels when asked to work in collaborative situations than when asked to work individually. Group diversity in terms of knowledge and experience contributes positively to the learning process.

Johnson and Johnson (1986) wrote that there is persuasive evidence that cooperative teams achieve higher levels of thought and retain information longer than students who work quietly as individuals. The shared learning gives students an opportunity to engage in discussion, take responsibility for their own learning, and thus become critical thinkers.

In studies conducted in the 1980s, it was found that cooperative learning promoted a greater use of higher level reasoning strategies and critical thinking than competitive learning (Gabbert, Johnson, & Johnson, 1985; Johnson & Johnson, 1981; Johnson, Skea, & Johnson, 1980).

Studies conducted by Skon, Johnson, and Johnson (1981) found that cooperative learning experiences promote more frequent insight into and use of higher level cognitive and moral reasoning strategies than do competitive or individualistic learning experiences (effect size = 0.93 and 0.97 respectively).

Johnson, Johnson, and Stanne (1989) proposed several plausible explanations for why cooperative learning promotes higher level thinking skills. It was proposed that the meta-cognitive thought process increased each member's ability to achieve. Also proposed was that group processing increased students' self-efficiency by directing attention toward skillful cooperative behavior and reducing personal inhibitions such as

self-doubt and self-preoccupation. A third proposal was that group processing resulted in members gaining insight into how to behave more effectively. Finally, it was also proposed that feedback members received concerning their use of social skills provided reinforcement for using these skills and increasing the frequency of their skillful behavior.

In this section the effects of cooperative learning on critical thinking have been discussed, but it would also be useful to define briefly what is critical thinking. This is also addressed in chapter 1 under definitions. Brookfield (1987) defined critical thinking as the process of reflecting on the assumptions of the underlying ideas and actions of ourselves and others and contemplating alternative ways of thinking and acting. Facione (1990) reported a consensus definition that described critical thinking as purposeful self-regulatory judgment that results in interpretation, analysis, evaluation, and inference, as well as explanation of the considerations upon which that judgment is made.

In summary, the studies mentioned above have examined the effects of cooperative learning on cognitive factors such as achievement, cognitive reasoning, critical thinking, and problem solving. The results of these studies have been clearly slanted in a positive direction (Mevarech, 1985). The final section in chapter 2 examines the effects of cooperative learning and cognitive achievement and affective outcomes.

Cooperative Learning and Cognitive Achievement

There is substantial evidence that cooperative learning significantly enhances academic achievement when compared with learning achievement in individualistic and competitive situations (Johnson & Johnson, 1989).

What are some of the research findings on the effects of cooperative learning on academic achievement? Johnson and Johnson (1989) described a meta-analysis procedure they conducted that reduced the 323 investigations on the subject since 1897 to a single analysis. They concluded that the average person in the cooperative learning setting performs at a level two-thirds of a standard deviation above the average person in a competitive setting and three quarters above the average setting in individualistic settings.

A major goal of higher education is promotion of higher levels of academic achievement. A study conducted by Norris and Barnett (1994) found that university students perceived that their knowledge and understanding had been greatly enhanced through cooperative learning. They talked of “learning with meaning, relevance and reality” as important characteristics of their learning experiences (Norris & Barnett, 1994). Additionally, cooperative learning provided university students with the opportunity to expand their analytical capabilities such as balancing convergent and divergent thought processes (Flannery, 1994; Jutras, 1994).

In a more recent study by Johnson, Johnson, and Smith (1998), over 168 students were examined that compared the relative efficacy of cooperative, competitive, and individualistic learning on the achievement of individuals 18 years or older. This study indicated that cooperative learning promotes higher individual achievement than do competitive approaches (effect size = 0.49) or individualistic ones (effect size = 0.53). When looking at effect sizes of this order, substantial increase in achievement is indicated.

They mean, for example, college students who would score at the 50th percentile

level when learning competitively score in the 69th percentile when learning cooperatively; students who would score at the 53rd percentile level when learning individualistically will score at the 70th percentile when learning cooperatively. (p. 6)

One last aspect about cooperative learning that seems to promote higher achievement is challenge and controversy (Johnson et al., 1991). Within the dynamics of a cooperative group, conflict arises when involved group members have different conclusions about information. The group must use different perceptions, opinions, reasoning processes, theories, and conclusions to reach consensus. When managed constructively, controversy promotes uncertainty about the correctness of one individual view and promotes an active search for more information and a re-conceptualization of one's knowledge. This then leads to higher mastery of the information. The research studies cited in this section leave no doubt about the effectiveness of cooperative learning in promoting higher achievement when used correctly. The last section in chapter 2 discusses the affective benefits of cooperative learning.

Cooperative Learning and Affective Outcomes

The last item included in this literature review is a discussion of the affective rewards and gains from working in a cooperative format. This is one of the most critical aspects of this dissertation, as physician assistant students must develop interpersonal skills to function in a health care interdisciplinary environment. This demands maturity and highly developed communication skills. For this reason, the literature about the affective benefits of cooperative learning was studied.

When looking at cooperative learning experiences compared with competitive and individualistic ones, cooperative learning tends to promote more positive attitudes toward

the subject area, more positive attitudes toward the instructional experience, and more continuing motivation to learn about the subject area being studied (Johnson et al., 1991).

Social cohesion in the classroom is also considered important for maximizing learning potential in the classroom. Astin (1987) suggests that feedback regarding task performance is accepted and used more constructively by students when there is a high degree of trust among students and between students and teachers. In competitive learning situations, students feel compelled to appear smart, hiding any weaknesses in their skills and knowledge base from both peers and instructor. Johnson, Johnson, and Maruyama (1983) have demonstrated that cooperative learning structures lead to increased social cohesion and words of trust in the classroom.

In a study conducted at an engineering school, Scarafiotti and Klein (1991) analyzed specifically the effects of cooperative learning on attitudes toward working in teams. Subjects were divided into small groups and cooperative teams. Instruction was the same for all subjects. Subjects in the cooperative teams perceived more accomplishment, enjoyed working in teams, and displayed higher levels of social and cognitive interactions than subjects who worked in unstructured small groups.

Social support is also important. Johnson, Johnson, and Holubec (1994) did a meta-analysis of 106 studies since the 1940s that compared the relative impact of cooperative, competitive, and individualistic efforts on social support. The studies found that cooperative learning promotes greater social support than does competitive learning. “This is important as social support promotes achievement, productivity, physical health, psychological health and the ability to cope with stress and diversity” (p. 22).

In a study conducted by Springer, Stanne, and Donovan (1999), a meta-analysis

was done that looked at multiple studies involving small-group learning in undergraduate Mathematics, Engineering, and Technology courses. The meta-analysis demonstrated that small-group learning is effective in enhancing more favorable attitudes toward learning and increased persistence in college.

Summary of Literature Review

This chapter provided a review of the literature related to cooperative learning. In the literature review, an attempt was made to describe the theoretical basis for the dissertation study that was conducted. A thorough survey of the cooperative learning literature was provided to examine the variables being researched in this dissertation study. The theoretical framework supporting cooperative learning was considered, followed by the evolution and history.

The general characteristics were described to provide foundation for the methodology utilized in the study. A brief survey of cooperative learning at both the secondary and post-secondary levels was provided as a comparison. The use of cooperative learning as a pedagogic tool was examined to compare lecture and cooperative learning as a teaching modality. The last sections of the literature review included the dependent variables included in this dissertation study: critical thinking, achievement, and attitudinal attributes of cooperative learning.

CHAPTER THREE

METHODOLOGY AND PROCEDURES

Description of the Population and Sample

The research study included 55 first-year physician assistant students enrolled in PHAS 203 Principles of Medicine, a course in the first semester of the professional program. Prior to the registration, the course was divided into sections 01 and 02. Section 01 was chosen as the cooperative learning, and section 02 was chosen as the lecture section. The students did not know the course was involved in the research study at the time of registration.

After registration, the distribution of the cooperative section consisted of 29 students: 10 males (34%), 19 females (66%). There were 21 Bachelor of Science students (72%) and 8 certificate students (28%). The lecture section consisted of 11 males (42%) and 15 females (58%); 14 bachelor students (54%) and 12 certificate students (46%). The overall distribution of the entire class was 55 students with 35 bachelor students (64%) and 20 certificate students (36%), 21 males (38%) and 34 females (62%).

The two sections, although not randomized, compared at the onset of the study very closely to the general population, although more bachelor students were enrolled in the cooperative section and more certificate students were enrolled in the lecture section

than the general population of the class. The student consent form was explained to the students (see Appendix A) and all students signed the consent form agreeing to participate in the study. Students were informed both verbally and in the consent form that they could transfer from the cooperative learning section to the lecture section at any time without prejudice or consequence. The fact that actual random sampling or stratified random sampling was not performed will be considered a limitation of the research study. Also, it was recognized that increasing sample size and repeating the study in additional classes would increase the statistical power of the study.

Identification of the Independent and Dependent Variables and Statement of the Research Hypotheses

The dependent variables for this study were:

1. Critical thinking skills
2. Cognitive achievement
3. Attitudes toward team learning.

The independent variables in this study included cooperative learning and the traditional lecture method of instruction.

Statistical Hypothesis: The research questions and research hypotheses investigated in the study are as follows:

Research Question 1: Is there a statistically significant difference in critical thinking skills between PAs educated in traditional lecture format versus a cooperative learning format?

Hypothesis 1: There is a statistically significant difference in critical thinking between the cooperative learning section and control group.

Research Question 2: Is there a statistically significant difference in cognitive achievement between PAs educated in a traditional lecture format versus a cooperative learning format?

Hypothesis 2: There is a statistically significant difference in cognitive achievement between the cooperative learning section and the control group.

Research Question 3: Is there a statistically significant difference in attitudes toward team learning between PAs educated in a traditional lecture format versus a cooperative learning format?

The attitude toward team learning was researched using the following nine items:

1. I enjoy working in groups to accomplish a task.
2. All members of my group were integral to the group's success.
3. The physical seating arrangement of my group contributed to the positive interaction of all members.
4. Each member of my group contributed to the effectiveness of our presentation and success of the group.
5. Using active listening skills enhanced communication in my group.
6. My group could have functioned better.
7. I will be better able to function as a team member in the future having participated in this new training format.
8. My group knew the goal of the group and understood its importance.
9. I think that we accomplished more as a group than we could have if we had worked individually.

The following nine sub-hypotheses test/relate to research question 3.

Hypothesis 3a: There is a statistically significant difference in the rating achieved for the statement “I enjoy working in groups to accomplish a task” between the cooperative learning section and the control group.

Hypothesis 3b: There is a statistically significant difference in the rating achieved for the statement “All members of my group were integral to the group success” between the cooperative learning section and the control group.

Hypothesis 3c: There is a statistically significant difference in the rating achieved for the statement “The physical seating arrangement of my group contributed to the positive interaction of all members” between the cooperative learning section and the control group.

Hypothesis 3d: There is a statistically significant difference in the rating achieved for the statement “Each member of my group contributed to the effectiveness of our presentation and success of the group” between the cooperative learning section and the control group.

Hypothesis 3e: There is a statistically significant difference in the rating achieved for the statement “Using active listening skills enhanced communication in my group” between the cooperative learning section and the control group.

Hypothesis 3f: There is a statistically significant difference in the rating achieved for the statement “My group could have functioned better” between the cooperative learning section and the control group.

Hypothesis 3g: There is a statistically significant difference in the rating achieved for the statement “I will be better able to function as a team member in the future having

participated in this new training format” between the cooperative learning section and the control group.

Hypothesis 3h: There is a statistically significant difference in the rating achieved for the statement “My group knew the goal of the group and understood its importance” between the cooperative learning section and the control group.

Hypothesis 3i: There is a statistically significant difference in the rating achieved for the statement “I think we accomplished more as a group than we could have if we had worked individually” between the cooperative learning section and the control group.

Research Question 4: Are there statistically significant gender, method of instruction, and academic program main effects on the cognitive achievement of physician assistant students as measured by the cognitive course exams?

Hypothesis 4: There is a significant gender, method of instruction, or academic program main effects on cognitive achievement of physician assistant students as measured by the cognitive course exams.

Research Question 5: Are there statistically significant two-way interactions between gender, method of instruction, and academic programs on cognitive achievement of physician assistant students as measured by the cognitive course exams?

Hypothesis 5: There is a significant two-way interaction between gender, method of instruction, and academic programs on cognitive achievement of physician assistant students as measured by the cognitive course exams.

Instrumentation

Watson-Glaser Critical Thinking Appraisal

The Watson-Glaser Critical Thinking Appraisal (WGCTA) is an 80-item multiple-choice examination constructed to assess critical thinking abilities through reading comprehension. Designed for Grades 9-16 and adults, the appraisal report scores for five content areas (inferences, recognition of assumptions, deductions, interpretation, and evaluation of argument) as well as a total score (Murphy, Conoley, & Impara, 1994). The total score on the WGCTA was used as a measure of critical thinking proficiency because the sub-scores are based upon a relatively small number of items and may lack sufficient reliability when used in place of a total score (Berger, 1985).

The WGCTA has a strong history and reputation as a test that pioneered the measurement of critical thinking. The instrument has undergone 30 years of research and development, and the most recent form of the test has fewer items (80 items instead of 100) and a shorter time limited for administration (40 minutes instead of 50).

The reliability of the instrument has been assessed in several ways. Estimates were made of the instrument's internal consistency (split half reliability, coefficients ranged from .69 to .85) and the stability of test scores over time (test and re-tests at a 3-month interval was .73 with means and standard deviations virtually identical over time) (Berger, 1985).

The decision to utilize the WGCTA was strengthened by the validity that has been supported in several ways:

1. The nature of item content and associated internal consistency
2. The presence of statistically significant relationships between its scores and those of reading and intelligence
3. The result of factor analytic studies yielding some confirmation of the separate subdivisions of critical thinking
4. The outcomes of a factor analytic study in which the factor structure could be related to that of other ability and aptitude tests

5. Empirical support for its hypothesized relationship to the Piagetian stage of formal operations.

A major limitation of using the WGCTA to measure critical thinking skills is the small number of items upon which the test is based.

Cognitive Course Exams

The PHAS 203 Principles of Medicine course requires the successful completion of four 100-point cognitive exams. These exams were machine-graded with a Scantron method to reduce grader error. The format of the questions was either multiple choice with five choices or matching format. The course design requires the completion of each of the four unit exams at the conclusion of the system or section of the course. Approximately 25% of the content of the course is tested in each unit exam. An example of a cognitive exam can be found in Appendix G, and the course syllabi can be found in Appendices D and F.

Both the cooperative learning and the lecture group took the same cognitive exams. The weakness of utilizing these exams to measure cognitive achievement is that it creates an advantage for the participants in the study who perform well on standardized exams, regardless of whether the student is in the experimental or control section. Another limitation is measuring cognitive achievement with only 100 questions when the amount of medical information contained in each course section is vast.

Attitude Survey Toward Group (Team) Learning

I received permission to use the survey used in the study authored by Jamie C. Scarafietti and James Klein at Arizona State University, entitled Effects of Cooperative

Learning Strategies on Performance Attitude and Group Behaviors in a Technical Team Environment (1991). Scarafiotti and Klein (1991) described the composition and measurement of the attitude survey. The attitude survey is a nine-item Likert-style survey. The nine items identify the degree to which each individual enjoyed working in a team format and how well the teams functioned as a unit in terms of learning strategies and active listening skills (see Appendix C).

These nine items targeted satisfaction from working in a group structure, the roles of the members as each related to the success of the groups, face-to-face intervention, the contribution of each member to the presentation and enhancement of active listening skills as a social skill, the functioning of the group as a unit, the effectiveness of training format knowledge of the common team goals, and group versus individual accomplishment (Klein & Scarafiotti, 1991). The Cronbach Alpha Internal-Consistency reliability of the attitude survey was 0.65. The authors of this attitudinal survey administered the survey as a posttest-only control design. The same approach of utilizing a posttest-only administration was used in this study.

The design and wording of the questions and the information sought make a pre- and post-design less attractive and may perhaps adversely affect the data. Krathworth (1998) stated, "Trusting randomization to make groups really comparable eliminates the need for pretest. A post test only control group design simply compares them at the post test" (p. 510).

Research Design

This dissertation employed a quasi-experimental design with a treatment and

control group. The treatment group refers to the cooperative learning section, and the control group refers to the lecture section. Within the participants of the study, there were two distinct populations in terms of educational background. The Certificate Program requires a Bachelor's degree to matriculate, while the Bachelor of Science Program requires a minimum of 1 year of college to matriculate.

What is the effect of cooperative learning on critical thinking?

The WGCTA was administered as a pretest and posttest to both the experimental and control group. The pretest was administered by another individual and the results were not revealed to me until the study was completed. This is further described in the section titled Procedures.

What is the effect of cooperative learning on cognitive achievement?

The four cognitive exams were given to both the quasi-experimental and control group on the same day.

What is the effect of cooperative learning on attitudes toward learning in teams?

The attitudinal survey was administered as a posttest-only design.

Procedures

In this section, a description of the administration of the treatment will be provided with a description of procedures that attempted to preserve internal validity and decrease researcher bias. The results of the pretest administration of the Watson Glaser Critical Thinking Appraisal were calculated and stored by another individual until the end of the semester and the post-course administration. This prevented me from having knowledge about the performance of either the quasi-experimental (cooperative) group or

the control (lecture) group.

Several guest speakers were utilized to lecture in the control section. This decreased the control I had over the delivery of the lecture section to avoid unconscious bias or change in teaching performance.

The cooperative learning technique chosen for this study is called Learning Together, developed by Johnson and Johnson in 1977 (chapter 2). The students in the cooperative learning section were fully oriented to the rules employed in the Learning Together method. This information also is contained in the syllabus (see Appendix D). Some of the hallmarks of Learning Together are group cohesion and group incentive. This was reflected in the grading used in this section. All students in both sections had to achieve a minimum of 70% in the cognitive exams. This was separate and apart from any group incentive employed in the cooperative learning section.

Pilot Studies

No formal pilot studies were conducted. However, I utilized cooperative learning techniques in three courses in the curriculum from 1999 to 2001. This was done to develop my cooperative learning skills and, through trial and error, to determine which methodology is most effective. The Watson-Glaser Critical Thinking Appraisal was administered to the incoming class in the Fall 2000. This was performed to gather some baseline scores and to test the instrument and to become familiar with the administration of the instrument.

Human Subjects Review Clearance

An application for approval of research involving human subjects was submitted

to the Institutional Review Board at Andrews University and accepted by the School of Education. The research study presented in this dissertation clearly falls under the exempt category. This is described as research conducted in established or commonly accepted educational settings involving normal education practices such as:

1. Research on regular and special-education instructional strategies, or
2. Research on the effectiveness of, or the comparison among instructional

techniques, curricula, or management methods. An acceptable consent form was approved through Andrews University prior to the initiation of this research study in September 2001. In addition approval was obtained from the Kettering Medical Center Institutional Review Board prior to initiating the study in September 2001 (see Appendix B).

Data Collection and Recording

The results of the pre- and post-administration of the Watson Glaser Critical Thinking Appraisal were scored on a special Scantron sheet designed for this study. The results were securely locked, and strict confidentiality was maintained. The cognitive exams were machine-scored and kept locked in the students' files.

The Attitudinal Survey was administered and collected with the same security system and the results were locked securely. After the data had been statistically analyzed, the results of the WGCTA and Attitudinal Survey were destroyed. The exams will remain in the students' files until they graduate.

The students' names were not published in the study. Rather, a coding system using numbers or letters was used to track the pre- and post-results and the data were

stored prior to statistical analysis.

Statistical Analysis of the Null Hypotheses

The statistical procedures used for each null hypothesis are described below:

Null Hypothesis 1: There is no statistically significant difference in critical thinking between the cooperative learning section and the control group. The statistical procedure utilized was the independent τ test to compare the pre- and post-scores between the quasi-experimental and control groups.

Null Hypothesis 2: There is no statistically significant difference in cognitive achievement between the cooperative learning section and control group. The statistical procedure utilized was an independent τ test to compare differences in test scores between the experimental and control group.

Null Hypothesis 3: There is no statistically significant difference in attitudes toward learning in teams between the cooperative learning section and the control group. The statistical procedure utilized was an independent τ test. Each of the nine statements was analyzed separately and labeled 3a. to 3i.

Statistical Analysis of Demographic Variables

In addition to the statistical analysis of the null hypotheses, further analysis of demographic variables was performed to help eliminate rival explanations that could have impacted the data outcomes and weakened the causal effects. This analysis examined main effects and two-way interactions.

Null Hypothesis 4: There are no significant gender, method of instruction, and academic program main effects on the cognitive achievement of physician assistant

students as measured by the cognitive course exams. A three-way ANOVA for main effects and interactions was conducted.

Null Hypothesis 5: There are no statistically significant two-way interactions between gender, method of instruction, and academic programs on cognitive achievement of physician assistant students as measured by the cognitive course exams. A three-way ANOVA for main effects and interactions was conducted.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF THE DATA

The purpose of the research study was to determine whether a statistically significant difference exists between students educated in a cooperative learning environment versus a traditional lecture environment. The research study utilized an introductory course in Principles of Medicine offered during the first semester for the professional phase of a Physician Assistant Program.

The dependent variables addressed in this study included critical thinking skills, cognitive achievement, and attitude toward learning in teams.

The administration and description of the instruments used to measure the dependent variables is described below.

The Watson Glaser Critical Thinking Appraisal was administered to the cooperative learning section and traditional lecture section as a pre- and post-test. Students were allowed a maximum of 40 minutes to take the exam. The pretest was administered in late August 2001 and the posttest was administered December 12, 2001. The pretest calculation was not performed until December to avoid any researcher bias.

The instrument utilized to measure cognitive achievement in the research study was four written multiple-choice examinations. The same exams were administered to the cooperative and traditional lecture section, each on the same day. The exams ranged

from 80 to 100 questions. The exams utilized multiple choice and matching questions. The students' numerical scores were composed of the total percentage achieved out of the maximum score.

The attitude-toward-learning-in-teams instrument consisted of nine items representing nine sub-hypotheses. The rationale for this approach was the size of the instrument. Since there are only nine questions and each question addresses a different aspect of team learning, I determined that to analyze the instrument as a single hypothesis would be ineffective to determine the responses and ratings of each individual statement.

The attitude survey toward team learning can be found in Appendix C. There are nine statements in the survey. In the pages to follow, each sub-hypothesis is presented separately, followed by the analysis and whether the null hypothesis was retained or rejected. The results of each statement have been analyzed separately using independent τ tests. The survey used a Likert scale scoring system with the following numerical choices:

5 = strongly agree

4 = generally agree

3 = neutral

2 = generally disagree

1 = strongly disagree

n/a = not applicable.

Because the lecture section was exposed to very little group work during the formal class period, the respondents were asked to rate the statements based upon personal experience in group and cooperative study.

Summary of the Study

Description of the Cooperative Section

The population that registered and participated in the quasi-experimental section consisted of 27 students. This included 17 females (63%), 10 males (37%); this included 19 students in the Bachelor's Program (70%), and 8 students in the Certificate Program (30%). The average age of the cooperative section was 30.1. During the semester, two students withdrew from the cooperative section and transferred to the lecture section. This represented a 7% mortality.

Syllabus and Policies

The syllabus for the cooperative learning section is located in Appendix C. The syllabus contains vital information used to orient the students to the basic policies and procedures used in cooperative learning. This includes a description of the instructional method utilized in the study called Learning Together. In addition, the general characteristics of cooperative learning were presented. The teacher's role in cooperative learning was described and carefully presented to the students to ensure understanding of the alternative role of the teacher. The students were informed about the group assignments and responsibilities to ensure true cooperative learning procedures were followed. The students' group assignments were predetermined and published in the syllabus. The course grade was based upon peer group assignment (10%), group assignments (20%), and the course cognitive exams (70%). Group grade incentive was included if all members of an individual group achieved greater than 80% on the written exams. Each individual student was required to achieve 70% of the total points included

in the four examinations.

Classroom Procedures

Each class session followed the exact same procedure. Students received outlines that contained vital information about the topic being studied that day. Each group would fill out a learning group assignment during the class period (see Appendix E). The group assignment contained 7 to 15 questions that required group analysis and processing. One student would act as the recorder; other students would research a topic, discuss the findings among the group, and determine the answer for each respective question. The group would hand in the assignment at the conclusion of each class period. Careful group monitoring was performed to ensure proper cooperative learning rules were followed.

Description of the Lecture Section

The population that registered and participated in the lecture or traditional section consisted of 28 students. This included 16 females (57%), 12 males (43%); this included 15 Bachelor students (54%) and 13 certificate students (46%). The average age of the traditional section was 26.6. During the semester two students joined the traditional section from the cooperative section.

Syllabus, Policies, and Classroom Procedures

The lecture section was presented and managed as a purely traditional lecture presentation. Students were given the same lecture/module outlines as the cooperative section. Lectures were then presented during the class period. The same topics were covered each class day in both the cooperative and lecture sections. Students were

required to achieve 70% of the sum of the average points in the four semester exams. No structured small-group sessions were conducted in the traditional section although studying in groups was encouraged.

Statistical Findings

The following statistical findings are the result of testing the null hypotheses related to their corresponding research question.

Research Question 1: Is there a statistically significant difference in critical thinking skills between PAs educated in traditional lecture format versus a cooperative learning format?

Null Hypothesis 1: There is no statistically significant difference in critical thinking skills between PAs educated in traditional lecture format versus a cooperative learning format.

The null hypothesis was retained as there was no statistically significant difference in critical thinking skills between PAs educated in a traditional lecture format ($t_{50} = -2.002, p = 0.051$).

An independent sample t test was performed on the pre-test scores to determine if any difference existed prior to the experiment. The pretest mean for the cooperative learning section was 55.11. The pre-test mean for the lecture section was 59.50, $SD = 7.57$.

The posttest results were analyzed with an independent sample t test to determine if cooperative learning had a positive impact on critical thinking scores and test the research hypothesis as stated. The null hypothesis was retained as there is no statistically

significant difference in critical thinking between the cooperative learning and control group.

The posttest mean for the cooperative learning section was 55.04, $SD = 9.94$. The mean score dropped 0.08 points from the pretest.

The posttest mean for the lecture group was 58.50, $SD = 11.45$. The mean score dropped 1.0 points from the pre-test ($t_{50} = -1.163, p = 0.250$).

Research Question 2: Is there a statistically significant difference in cognitive achievement between PAs educated in a traditional lecture format versus a cooperative learning format?

Null Hypothesis 2: There is no statistically significant difference in cognitive achievement between PAs educated in a traditional lecture format versus a cooperative learning format.

The null hypothesis was retained as there is no statistically significant difference in cognitive achievement between PAs educated in a traditional lecture format versus a cooperative learning format.

Results for Semester Cumulative Scores

The cooperative learning section achieved a mean score of 84.19 when combining the total score of the four exams. The traditional (lecture section) achieved a mean score of 85.27 when combining the total score of the four exams ($t_{53} = 0.976, p = 0.333$).

Table 1 provides a summary of the cognitive exam results during the semester.

Table 1

Comparison of Cognitive Achievement Scores Between Cooperative and Lecture Sections

	Cooperative Mean <i>N</i> = 27	Lecture Mean <i>N</i> = 26	<i>t</i> value	<i>P</i> value
Test 1	85.81	87.35	0.791	0.433
Test 2	80.40	83.30	-1.079	0.285
Test 3	84.59	85.18	-0.290	0.773
Test 4	85.96	85.26	0.177	0.867
Cumulative	84.19	85.27	0.976	0.333

Research Question 3: Is there a statistically significant difference in attitudes toward team learning between PAs educated in a traditional lecture format versus a cooperative learning format?

Research question 3 was analyzed with nine sub-hypotheses. The null hypothesis was retained in sub-hypotheses 3a, 3c, 3e, 3f, 3g, and 3i as there was no statistically significant difference in attitude toward learning in teams between the cooperative learning section and the control group.

Sub-hypothesis 3a: I enjoy working in groups to accomplish a task ($t_{42} = 1.59$, $P = 0.124$).

The cooperative learning mean score was $M = 3.96$. The traditional section mean score was $M = 3.47$.

Sub-hypothesis 3c: The physical seating arrangement of my group contributed to the positive interaction of all members ($t_{42} = 1.66$, $p = 0.103$).

The cooperative learning mean score was $M = 4.00$. The traditional section mean score was $M = 3.47$.

Sub-hypothesis 3e: Using active listening skills enhanced communication in my group ($t_{42} = -1.09, p = 0.279$).

The traditional lecture section mean score was $M = 4.30$. The cooperative section mean score was $M = 4.00$.

Sub-hypothesis 3f: My group could have functioned better ($t_{42} = 0.844, p = 0.403$).

The traditional lecture section mean score was $M = 3.80$. The cooperative learning section mean score was $M = 3.50$.

Sub-hypothesis 3g: I will be better able to function as a team member having participated in this new training format ($t_{42} = 1.87, P = 0.069$).

The cooperative learning section mean score was $M = 3.59$. The traditional lectures section mean score was $M = 3.37$.

Sub-hypothesis 3i: I think we accomplished more as a group than we could have if we had worked individually ($t_{40} = 1.58, p = 0.123$).

The cooperative section mean score was $M = 3.62$. The traditional lecture section mean score was $M = 3.06$.

The null hypothesis was rejected in sub-hypothesis 3b, 3d, and 3h as there was a statistically significant difference in attitude toward learning in teams between the cooperative learning section and the control group.

Sub-hypothesis 3b: All members of my group were integral to the group's success ($t_{42} = 3.63, P = 0.001$).

The cooperative learning mean score was $M = 4.22$. The traditional lecture mean score was $M = 3.11$.

Sub-hypothesis 3d: Each member of my group contributed to the effectiveness of

our presentation and success of the group ($t_{42} = 4.77$, $P = 0.000$).

The cooperative learning section mean score was $M = 4.29$. The traditional section mean score was $M = 3.17$.

Sub-hypothesis 3h: My group knew the goal of the group and understood its importance ($t_{42} = 2.96$, $P = 0.005$).

The cooperative learning section mean score was $M = 4.37$. The traditional lecture section mean score was $M = 3.58$. Table two summarizes the statistical results from the analysis of sub-hypotheses 3a-3i.

Table 2

Summary of Attitudinal Survey Results and Analysis Between the Cooperative and Lecture Sections

	Cooperative Mean $N=27$	Lecture Mean $N=26$	t Value	P Value
3a. I enjoy working in groups to accomplish a task.	3.96	3.47	1.59	0.124
3b. All members of my group were integral to the group's success.	4.22	3.11	3.63	0.001**
3c. The physical seating arrangement of my group contributed to the positive interaction of all members.	4.00	3.47	1.66	0.103
3d. Each member of my group contributed to the effectiveness of our presentation and success of the group.	4.29	3.17	4.77	0.000***
3e. Using active listening skills enhanced communication in my group.	4.30	4.00	-1.09	0.279
3f. My group could have functioned better.	3.80	3.50	0.844	0.403
3g. I will be better able to function as a team member in the future having participated in this new training format.	3.59	3.37	1.87	0.069
3h. My group knew the goal of the group and understood its importance.	4.37	3.58	2.96	0.005**
3i. I think that we accomplished more as a group than we could have if we had worked individually.	3.62	3.06	1.58	0.123
Average	4.01	3.41		

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

Research Question 4: Are there statistically significant gender, method of instruction, and academic program main effects on the cognitive achievement of physician assistant students as measured by the cognitive course exams?

Null Hypothesis 4: There is no statistically significant gender, method of instruction, and academic program main effects on the cognitive achievement of physician assistant students as measured by the cognitive course exams.

Research Question 4: Are there statistically significant gender, method of instruction, and academic program main effects on the cognitive achievement of physician assistant students as measured by the cognitive course exams?

Null Hypothesis 4: There is no statistically significant gender, method of instruction, and academic program main effects on the cognitive achievement of physician assistant students as measured by the cognitive course exams.

Research Question 5: Are there statistically significant two-way interactions between gender, method of instruction, and academic programs on cognitive achievement of physician assistant students as measured by the cognitive course exams?

Null Hypothesis 5: There is no statistically significant two-way interactions between gender, method of instruction, and academic programs on cognitive achievement of physician assistant students as measured by the cognitive course exams.

The null hypothesis was retained as there are no statistically significant two-way interactions between gender, method of instruction, and academic programs on cognitive achievement of physician assistant students as measured by the cognitive course exams.

The statistically significant results are summarized in Table 3.

Table 3

Three-Way ANOVA for Main Effects and Interactions

Source	Sum of Squares	df	MS	F-Ratio	P-Value
MAIN EFFECTS					
A: gender	7.48024	1	7.48024	0.19	0.6626
B: methcode	21.7563	1	21.7563	0.56	0.4577
C: acadcode	116.577	1	116.577	3.00	0.0895
INTERACTIONS					
AB	0.787904	1	0.787904	0.02	0.8873
AC	1.00702	1	1.00702	0.03	0.8727
BC	137.001	1	137.001	3.53	0.0664
RESIDUAL	1863.06	48	38.8137		
TOTAL (CORRECTED)	2199.38	54			

Note. All *F*-ratios are based on the residual mean square error.

Summary

The results of the critical thinking appraisal, cognitive scores, and the attitudes survey were described. The null hypotheses for the three main hypotheses and the two sub-hypotheses were supported. Further discussion of the results follows in chapter 5.

CHAPTER FIVE

SUMMARY, DISCUSSION, CONCLUSIONS, AND
RECOMMENDATIONS

Introduction

This chapter presents a brief overview of the background and rationale for the research study, and a brief description of the supporting literatures. A summary and discussion will present a review of the research findings for each research hypothesis and reflective conclusions about the outcome of the findings. Conclusions about the research study will be presented that raise questions about the results of the study, as they relate to cooperative learning and physician assistant education. The chapter concludes with recommendations for future research.

The genesis of this research study was identified in the statement of the problem that presented that no scientific research has been identified to determine the most optimal pedagogic technique to educate physician assistant students.

The definition of the physician assistant developed by the American Academy of Physician Assistants describes the professional role as requiring autonomy in medical decision making. This requires PAs to possess critical thinking skills, highly developed interpersonal skills, and excellent intellectual skills to achieve this level of functioning.

Physician assistant programs typically utilize a lecture-based approach. Critical

thinking and interpersonal skills cannot be learned in a lecture based system. Cooperative learning provides an alternative learning environment in which students learn in group and are given the opportunity to participate in an educational environment more conducive to developing the skills necessary to become critical thinkers. Cooperative learning has been used in primary, secondary, and higher education and has been shown to enhance critical thinking skills and academic achievement in numerous studies (Johnson, Johnson, & Stan, 2000).

Research has demonstrated the benefits of using cooperative learning instructional techniques at the elementary and secondary level. However, the number of studies conducted at the college level has been scarce in comparison. In a meta-analysis conducted by Johnson et al. (2000), it was found that 24% of experimental studies have been conducted at the college level. In addition, a comprehensive literature search failed to demonstrate any previous research involving cooperative learning in physician assistant education. This research study was conducted to determine whether a statistically significant difference existed between traditional lecture methodology and cooperative learning for preparing physician assistants using the following dependent variables: critical thinking skills, cognitive achievement, and attitude toward learning in teams.

Summary and Discussion

The subjects of the study were 55 physician assistant students enrolled in a course in the first semester of the first year called Principles of Medicine. The students were divided into either the quasi-experimental cooperative section or the traditional lecture

section. The principal sources of data were scores on the Watson Glazer Critical Thinking Appraisal, cognitive course exams, and a survey measuring attitudes toward learning in teams.

The null hypotheses tested in this research study and the corresponding null hypotheses are outlined below. In addition, a brief presentation whether the null hypothesis was retained or rejected is included.

Null Hypothesis 1: There is no statistically significant difference in critical thinking skills between PAs educated in traditional lecture format versus a cooperative learning format.

The null hypothesis was retained as there was no statistically significant difference in critical thinking skills between PAs educated in a traditional lecture format.

Null Hypothesis 2: There is no statistically significant difference in cognitive achievement between PAs educated in a traditional lecture format versus a cooperative learning format.

The null hypothesis was retained as there is no statistically significant difference in cognitive achievement between PAs educated in a traditional lecture format versus a cooperative learning format.

Null Hypothesis 3a: There is no statistically significant difference in the rating achieved for the statement "I enjoy working in groups to accomplish a task" between PAs educated in a traditional lecture format versus a cooperative learning format.

The null hypothesis was retained as there is no statistically significant difference in the rating achieved for the statement "I enjoy working in groups to accomplish a task" between PAs educated in a traditional lecture format versus a cooperative learning

format.

Null Hypothesis 3b: There is no statistically significant difference in the rating achieved for the statement “all members of my group were integral to the group success” between PAs educated in a traditional lectures format versus a cooperative learning format.

The null hypothesis was rejected as there is a statistically significant difference in the rating achieved for the statement “All members of my group were integral to the group success” between PAs educated in a traditional lecture format versus a cooperative learning format.

Null Hypothesis 3c: There is no statistically significant difference in the rating achieved for the statement “The physical seating arrangement of my group contributed to the positive interaction of all members” between PAs educated in a traditional lecture format versus a cooperative learning format.

The null hypothesis was retained as there is no statistically significant difference in the rating achieved for the statement “The physical seating arrangement of my group contributed to the positive interaction of all members” between PAs educated in a traditional lecture format versus a cooperative learning format.

Null Hypothesis 3d: There is no statistically significant difference in the rating achieved for the statement “Each member of my group contributed to the effectiveness of our presentation and success of the group” between PAs educated in a traditional lecture format versus a cooperative learning format.

The null hypothesis was rejected as there is a statistically significant difference in the rating achieved for the statement “Each member of my group contributed to the

effectiveness of our presentation and success of the group” between PAs educated in a traditional lecture format versus a cooperative learning format.

Null Hypothesis 3e: There is no statistically significant difference in the rating achieved for the statement “Using active listening skills enhanced communication in my group” between PAs educated in a traditional lecture format versus a cooperative learning format.

The null hypothesis was retained as there is no statistically significant difference in the rating achieved for the statement “Using active listening skills enhanced communication in my group” between PAs educated in a traditional lecture format versus a cooperative learning format.

Null Hypothesis 3f: There is no statistically significant difference in the rating achieved for the statement “My group could have functioned better” between PAs educated in a traditional lecture format versus a cooperative learning format.

The null hypothesis was retained as there is no statistically significant difference in the rating achieved for the statement “My group could have functioned better” between PAs educated in a traditional lecture format versus a cooperative learning format.

Null Hypothesis 3g: There is no statistically significant difference in the rating achieved for the statement “I will be better able to function as a team member in the future having participated in this new training format” between PAs educated in a traditional lecture format versus a cooperative learning format.

The null hypothesis was retained as there is no statistically significant difference in the rating achieved for the statement “I will be better able to function as a team member in the future having participated in this new training format” between PAs

educated in a traditional lecture format versus a cooperative learning format.

Null Hypothesis 3h: There is no statistically significant difference in the rating achieved for the statement “My group knew the goal of the group and understood its importance” between PAs educated in a traditional lecture format versus a cooperative learning format.

The null hypothesis was rejected as there is a statistically significant difference in the rating achieved for the statement “My group knew the goal of the group and understood its importance” between PAs educated in a traditional lecture format versus a cooperative learning format.

Null Hypothesis 3i: There is no statistically significant difference in the rating achieved for the statement “I think we accomplished more as a group than we could have if we had worked individually” between PAs educated in a traditional lecture format versus a cooperative learning format.

The null hypothesis was retained as there is no statistically significant difference in the rating achieved for the statement “I think we accomplished more as a group than we could have if we had worked individually” between PAs educated in a traditional lecture format versus a cooperative learning format.

Research Hypothesis 4: There is a significant gender, method of instruction, or academic program main effects on cognitive achievement of physician assistant students as measured by the cognitive course exams.

Null Hypothesis 4: There is no statistically significant gender, method of instruction, and academic program main effects on the cognitive achievement of physician assistant students as measured by the cognitive course exams.

The null hypothesis was retained as there are no statistically significant gender, method of instruction, or academic program main effects on cognitive achievement of physician assistant students as measured by the cognitive course exams.

Research Hypothesis 5: There is a significant two-way interaction between gender, method of instruction, and academic programs on cognitive achievement of physician assistant students as measured by the cognitive course exams.

Null Hypothesis 5: There is no statistically significant two-way interaction between gender, method of instruction, and academic programs on cognitive achievement of physician assistant students as measured by the cognitive course exams.

The null hypothesis was retained as there are no statistically significant two-way interactions between gender, method of instruction, and academic programs on cognitive achievement of physician assistant students as measured by the cognitive course exams.

The results of this research study were not consistent with scientific research conducted on cooperative learning in the past at the elementary and secondary levels. The results of this dissertation study were, however, consistent with an earlier dissertation conducted by Smith (1984). This dissertation compared outcomes involving achievement affective outcomes and group processing skills. This study also revealed no statistically significant difference between treatment groups. This raises some question about the effectiveness of cooperative learning at the college level.

Research has demonstrated the benefits of using cooperative learning instructional techniques at the elementary and secondary levels. However, the number of studies conducted at the college level has been scarce in comparison. In a meta-analysis conducted by Johnson et al. (2000), it was found that 24% of experimental studies have

been conducted at the college level. In addition, a comprehensive literature search failed to demonstrate any previous research involving cooperative learning in physician assistant education.

The research involving cognitive learning compared to individualistic learning has supported that critical thinking, academic achievement, and attitudes toward working in groups is enhanced when using cognitive learning. In studies conducted in the 1980s, it was found that cooperative learning promoted a greater use of higher level reasoning strategies and critical thinking than competitive learning (Gabbert et al., 1985; Johnson et al., 1981; Johnson et al., 1980).

Studies conducted by Skon et al. (1981) found that cooperative learning experiences promote more frequent insight into and use of higher level cognitive and moral reasoning strategies than do competitive or individualistic learning experiences (effect size = 0.93 and 0.97 respectively).

A major goal of higher education is promotion of higher levels of academic achievement. A study conducted by Norris and Barnett (1994) found that university students perceived that their knowledge and understanding had been greatly enhanced through cooperative learning. They talked of “learning with meaning, relevance and reality” as important characteristics of their learning experiences (Norris & Barnett, 1994). Additionally, cooperative learning provided university students with the opportunity to expand their analytical capabilities such as balancing convergent and divergent thought processes (Flannery, 1994; Jutras, 1994).

In a more recent study by Johnson, Johnson, and Smith (1998), over 168 students were examined that compared the relative efficacy of cooperative, competitive, and

individualistic learning on the achievement of individuals 18 years or older. This study indicated that cooperative learning promotes higher individual achievement than do competitive approaches (effect size = 0.49) or individualistic ones (effect size = 0.53).

In a study conducted at an engineering school, Scarafiotti and Klein (1991) analyzed specifically the effects of cooperative learning on attitudes toward working in teams. Subjects were divided into small groups and cooperative teams. Instruction was the same for all subjects. Subjects in the cooperative teams perceived more accomplishment, enjoyed working in teams, and displayed higher levels of social and cognitive interactions than subjects who worked in unstructured small groups.

Social support is also important. Johnson, et al. (1994) did a meta-analysis of 106 studies since the 1940s that compared the relative impact of cooperative, competitive, and individualistic efforts on social support. The studies found that cooperative learning promotes greater social support than does competitive learning. "This is important as social support promotes achievement, productivity, physical health, psychological health and the ability to cope with stress and diversity" (p. 22).

The fact that the findings of this research study were not consistent with the literature may shed further light on the applicability of cooperative learning in certain fields of study.

In the field of physician assistant education, no known scientific research comparing cooperative learning with traditional classroom instruction has been attempted. Some factors that may have influenced the outcome of this study relate to the type of students in the study and the subject matter in the professional field.

PA education in the didactic phase emphasizes acquisition of an extensive

medical knowledge base. The information that was covered in the class involved learning basic principles of medical science. Much of the information involved rote memorization. Perhaps the PA program deals with information that is too objective. You either know it or you do not. The pedagogic approach has little impact on the outcome when comparing cognitive learning and traditional lecture.

Another factor that must be considered is the homogenous nature of the population. PA students are high achievers and are motivated to perform well academically regardless of the pedagogic approach being utilized. Questions could be raised about whether the coalescence of the aforementioned factors such as high achieving students and content-based education begs one to consider whether discipline-specific pedagogy should be examined. Another consideration is to match the type of learning expectation with the optimal pedagogic approach.

Research has demonstrated the effectiveness of lecture, discussion, and cooperative learning. McKeachii and Kerlik (1975) found that lectures were superior to discussion to promote factual information; discussions were superior to lecture to promote higher level reasoning skills, positive attitudes, and motivation to learn.

Johnson, Johnson, and Smith (1991) determined that if material is complex, detailed, or abstract and students are required to analyze, synthesize, and interpret knowledge, cooperative approaches are superior to lecture.

One conclusion that can be drawn from this study is that students can learn the same material using vastly different teaching approaches. One approach, the lecture, is effective to expedite the dissemination of factual information. Cooperative learning was equally effective in facilitating learning of the same factual information.

Are students conditioned and oriented toward traditional lecture education? Some comments by the students in the course evaluation were both perplexing and intriguing. The cooperative learning section rated the course involved in the study significantly lower than the traditional section. The mean score was 2.68 on a 1-4 scale with 4 being excellent and 1 being poor. The lecture section's mean score was 3.22. Some of the written comments by the students in the cooperative section included some interesting reflections. This included "I taught myself", "The instructor was not helpful", and "I paid money for a course and did not receive any instruction". The rating for the course and comments provided some qualitative information that was thought provoking. One question that comes to mind was how the attitude toward the cooperative learning process may have affected the study.

Although this research study failed to demonstrate any differences in cognitive achievement or critical thinking between groups educated in a cooperative learning environment and a traditional lecture environment, the attitudinal survey toward learning in terms demonstrated statistical differences between the cooperative and lecture section in three of the nine statements.

Sub-hypothesis 3b: All members of my group were integral to the group's success.

The cooperative group perceived group interdependence, demonstrating that the experience in cooperative groups increased the students' appreciation of how each student's role contributed to the group collectively.

Sub-hypothesis 3d: Each member of my group contributed to the effectiveness of our presentation and success of the group.

This question demonstrated statistical significance, reinforcing the concept that group interdependence was fostered among members of the cooperative group.

Sub-hypothesis 3h: My group knew the goal of the group and understood its importance.

This question demonstrated statistical significance, demonstrating that students in the cooperative section had some understanding of cooperative learning structure and how group goals play an important role in interdependence among term members.

It appears that exposure to cooperative learning had some impact on students' perception of social interdependence. Deutsch (1962) noted that interdependence could be positive. Johnson and Johnson (1998) stated that social interdependence influences outcomes and positive interdependence results in promotive interaction.

What changes might have occurred in the social interaction patterns of the students in the experimental group? There was no known method to accurately measure whether behavioral patterns were permanent rather than being "play acted" in the classroom to achieve the desired grade. Perhaps more effort could be made to create an environment where the socio-cognitive conflict occurs. As Johnson and Johnson (1998) stated, this conflict created "cognitive disequilibria which in turn stimulates cognitive development" (p. 27). This makes it paramount to create a more congruent environment to maximize intellectual conflict.

Although this study had limitations and a lack of generalizability, the three sub-hypotheses in which the null hypothesis was rejected provided food for thought. If students began to understand the importance of group interdependence, what are the potential social and emotional implications? How can this be more specifically

measured? Is there a method of measuring group interdependence on the impact of clinical performance? These are questions that will be raised in the conclusions and implications for future research.

Conclusions

The results of this research study were not consistent with many of the research studies in the elementary and secondary education which support that cooperative learning is superior to individualistic learning in the areas tested. The reasons for this may be impossible to determine, but one might speculate some plausible causes.

The type of student in physician assistant programs is largely homogenous in terms of intellectual ability. Because of the vigorous screening of applicants, academically capable students comprise the population in PA programs. This may be a reason why there was no statistically significant difference in cognitive achievement and critical thinking. The student's critical thinking skills may be highly developed at admission, leaving little room for growth regardless of the teaching method employed in the curriculum. The Watson Glaser Critical Thinking Appraisal may lack specificity and complexity to discern critical thinking development.

Academic achievement may be enhanced by cooperative learning in many fields of study in higher education. Physician assistant education emphasizes memorization of factual information during the didactic phase of the curriculum. Therefore with a high achieving population, the students are self-motivated and self-directed learners; although this is a positive attribute, the pedagogic approach may have little bearing on outcomes.

Although the results of the study involving critical thinking and cognitive

achievement were inclusive, the experience working in groups and the interpersonal interactions present the most intriguing possibilities. The statistical analysis did reveal differences between the cognitive learning group and the traditional lecture group. The students gained experience working in teams and were forced to assume responsibility for learning the material.

The effects of this interaction may not bear fruit until the students enter the clinical phase of the curriculum or after graduation. Most learning beyond the didactic phase of the PA program involves team collaboration and self-directed learning. The use of qualitative research techniques may have allowed me to perceive these interactions with enhanced acuity. This will be further explored in recommendations for further research.

Recommendations for Future Research

This research study focused on methods to increase internal validity. This included an experimental section and a control section. This significantly decreased the generalizability of the study and external validity. The study was exclusively quantitative in nature. Therefore:

1. The use of interviews and observation techniques could enhance future research especially when considering attitudinal change. It could be valuable to understand from the students' perspective how different pedagogic approaches impact attitudinal change and skills interacting in groups or teams. Another consideration to support a qualitative element is to determine how different teaching approaches impact students with differing learning styles.

2. Consider more research on the area of discipline specific pedagogy. The question must be raised as to which pedagogy maximizes learning in specific disciplines. Fields such as medicine that emphasize acquisition of a specific cognition database require a variety of pedagogic approaches. The combination of pedagogic approaches may also maximize learning when teaching a high achieving population with diverse learning styles.

3. A survey could be administered to the participants of the research study at the end of the professional program. The survey instrument would ask questions that discern differences in attitudes toward collaboration and learning in teams between the experimental and control groups.

4. Expand the scope of cooperative learning into the curriculum. A future research study might measure student attitudes regarding learning in teams and collaboration upon graduation before and after initiating the integration of cooperative learning into the curriculum.

5. Physician assistants in professional practice are involved with patient counseling, gathering historical data, and interacting with other members of the health care team. These are important attributes that are measured and evaluated by preceptors during the clinical phase of the program. A future research study could compare the ratings received from preceptors that address social interaction between students who received education involving cooperative learning and students who were educated in a traditional lecture environment. This would require following students over a longer period of time and expanding the exposure to cooperative learning.

6. Consider a research study that involves several allied health disciplines. For

example, a collaboration research study might involve Physician Assistants, Respiratory Therapists, Nurses, and others. These professionals in training could be placed in cooperative trained groups and informally formed groups in a required interdisciplinary course required by all students. The study might focus on attitudes toward interdisciplinary collaboration.

The maturing field of Physician Assistant education is lacking in scientific research regarding the most optimal pedagogical approach to training physician assistants. In closing, this research study provided excellent insights about how students perform with vastly different learning environments. Much research can be done in the future, examining how cooperative learning might impact interpersonal communication skills, especially when students enter the clinical phase of training. Another fertile area for future study would involve interdisciplinary courses that could study the impact of pedagogy on collaboration behavior. Hopefully, this study provided a contribution to the field of cooperative learning and will stimulate future research into the educational processes involved in training physician assistants.

APPENDIX A
STUDENT CONSENT FORM

Andrews University
 School of Education
 Leadership Program
 Scott Lee Massey, MS, PA-C
 Doctoral Student

The Effects of Cooperative versus Traditional Classroom Instruction

First Year Physician Assistant Students

Thank you for volunteering to participate in my dissertation study that compares the effects of cooperative learning and traditional lecture methodology. You have been randomly selected to participate in either the lecture section or cooperative learning section. This study will help me to determine which teaching approach best maximizes learning.

Cooperative learning is a method of learning that utilizes small groups to process and analyze information. This group processing replaces the traditional lecture. In numerous scientific studies cooperative learning has been found to have positive affects over traditional lecture on critical thinking, cognitive achievement, and positive enhancement of affective skills.

This study will be conducted in the course Principles of Medicine I PHAS 220. The research study will begin in September and conclude in December 2001.

At the beginning of the semester and at the conclusion of the semester all students will take a test called the Watson-Glaser Critical Thinking Appraisal. This is an 80-question multiple choice exam that has been validated for over 25 years of study to test critical thinking skills. Both groups will take the same written exams during the semester. At the conclusion of the semester all students will take a survey that measures attitudes towards working and learning as teams.

All information collected will be held in strictest confidence. While this information will be published at no time will your name be used. Your decision to participate or not to participate will not affect your grade in the class.

Students in the cooperative learning section are allowed to transfer to the lecture section at any time without prejudice or consequences. If you have any questions concerning this project or consent, please call Scott Massey at 937-296-7238 or Dr. Hinsdale Bernard at 616-471-6702.

I, _____ hereby give my consent to participate in the project described above. I have read and understand the statement and have had all my questions answered.

Date

Student

APPENDIX B
ATTITUDE SURVEY TOWARD
TEAM LEARNING

Attitude Survey Toward Team Learning

INSTRUCTIONS: consider each item separately and rate each item independently of all others. Circle the rating that indicates the extent to which you agree with each statement. Please do not skip any rating. If you do not know about a particular area, please circle N/A.

5 = Strongly Agree 4 = Generally Agree 3 = Neutral (acceptable) 2 = Generally Disagree

1 = Strongly Disagree N/A = Not Applicable

1.	I enjoy working in groups to accomplish a task.	5	4	3	2	1	N/A
2.	All members of my group were integral to the group's success.	5	4	3	2	1	N/A
3.	The physical seating arrangement of my group contributed to the positive interaction of all members.	5	4	3	2	1	N/A
4.	Each member of my group contributed to the effectiveness of our presentation and success of the group.	5	4	3	2	1	N/A
5.	Using active listening skills enhanced communication in my group.	5	4	3	2	1	N/A
6.	My group could have functioned better.	5	4	3	2	1	N/A
7.	I will be better able to function as a team member in the future having participated in this new training format.	5	4	3	2	1	N/A
8.	My group knew the goal of the group and understood its importance.	5	4	3	2	1	N/A
9.	I think that we accomplished more as a group than we could have if we had worked individually.	5	4	3	2	1	N/A

APPENDIX C

SYLLABUS
PHAS 203 – PRINCIPLES OF MEDICINE I

PHAS 203

Principles of Medicine I	Class meeting time: Monday	1:30-3:20p.m.
Fall 2001	Wednesday	1:30-3:20p.m.
3 credit hours	Classroom:	G-28
Section 01		

Course Director: Scott L. Massey, MS, PA-C
 E-mail: scott.massey@kmcnetwork.org

Office hours by appointment: contact Neida Rowland at 937-296-7238

Course Faculty: Scott L. Massey, MS, PA-C
 Selected guest faculty for group facilitation

Textbook: Course Description Principles of Medicine, PHAS 203
 A study of common medical and/or surgical disorders encountered in general Adult Medicine includes typical clinical presentation, etiology, pathophysiology, diagnostic work-up and management of these disorders.

Instructional Method

The course will utilize the educational technique called cooperative learning. Cooperative learning is the instructional use of small groups that allows students to work together to maximize their own and each others learning.

The cooperative learning method that will be used in this course is called “learning together” developed by David Johnson and Roger Johnson in 1977. The Johnson’s are considered among the foremost authority in the field of cooperative learning. Learning together uses a group study task structure with a cooperative incentive structure (see grading methods) in which students receive a group reward for a group product. Learning together involves the highest degree of cooperation between students and can be used for most subjects. The method learning together was ranked # 1 among the eight methods of cooperative learning in a recent meta-analysis that examined over 200 scientific studies in terms of achieving positive results over competitive and individualistic learning.

Characteristics of Cooperative Learning

1. Classes are divided into small groups with two to six members. Four is considered optimal and will be utilized in this class.
2. Groups have an interdependent structure with high individual accountability.
3. Clearly defined objectives are specified for the groups.
4. A cooperative environment and a reward system are present within the groups.
5. Students support each other’s efforts to achieve.
6. There is monitoring of group members: behavior.

Just placing student together does not constitute true cooperative learning.

To be cooperative a group must have clear positive interdependence, members must promote each other's learning and success face to face, hold each other personally and individually accountable to do his/her fair share of the work, use appropriately the interpersonal and small groups skills needed for cooperative efforts to be successful and process as a group how effectively members are working together.

The cooperative learning literature often talks about the altered role of the teacher in cooperative learning. Rather than being the "sage on the stage". The teacher becomes the "guide on the side". The teacher has a six-part role in formal cooperative learning.

1. Specifying the objectives for the lesson.
2. Making pre-instructional decisions about learning groups room arrangement, instructional materials and student's role within the groups.
3. Explaining the task and goal structure to the students.
4. Setting the cooperative lesson in motion.
5. Monitoring the effectiveness of the cooperative learning groups and intervening as necessary.
6. Evaluating student's achievement and helping them discuss how well they collaborating with each other.

Group Assignments in Cooperative Learning

Appropriate social skills are further developed through the use of group roles during the small group session. Besides the academic task each student takes on added responsibilities. Below are suggested roles that members may assume during cooperative lessons. Because groups will be composed of four members students may assume more than one role.

1. Recorder: Takes note during the group discussion and compiles a presentation for the whole group.
2. Reporter: Presents the information to the group and ensures that the recorder accurately records the information on the assignment sheet.
3. Encourages: Ensures that everyone has the opportunity to participate in the groups work and not allow anyone to be a social loafer, also, praises members for contributions.
4. Checker: Monitors the group member understanding of the topic under discussion and stops the group work for clarification when someone is confused.
5. Observer: Monitors and records the overall behaviors of the group according to an agreed upon checklist of assignments.

This list was composed by David W. Johnson and Roger T. Johnson in
“Learning Together and Alone”

1. Arrange the classroom to promote cooperative goals. Students will need to work in clusters, and seating arrangements should reflect this need. Provide sufficient space and study areas for students to share.
2. Present the objectives as group objectives. The group and not the individual is the focus. Gear reward structure to achieving group objectives.
3. Communicate intentions and expectations. Students need to understand what is being attempted. They should know what to expect from the teacher and from each student in the group and what the teacher expects them to accomplish.
4. Encourage a division of labor where appropriate. Students should understand their roles and responsibilities. This will take time and practice.
5. Encourage students to share ideas materials and resources. Students should look to each other and not the teacher. The teacher may act as a catalyst in making suggestions, but not be the major source of ideas.
6. Supply a variety of materials. Since the sharing of materials is essential to the group, sufficient quantities and variety are needed.
7. Encourage students to communicate their ideas clearly. Verbal messages should be clear and concise. Verbal and nonverbal messages should be congruent with each other.
8. Encourage supportive behavior and point out rejecting or hostile behavior. Behaviors such as silence, ridicule, personal criticism, one-upmanship, and superficial acceptance of an idea should be discussed and stopped since they hinder cooperation and productive group behavior.
9. Provide appropriate cues and signals. Point out when the noise level is too high. Direct the group’s attention to individual problems and encourage students to use the group.
10. Monitor the group. Check the progress of individuals in a group and of the group as a whole. Explain and discuss problems, assist, and give praise as appropriate.
11. Evaluate the individual and group. In evaluation focus on the group and its progress. Evaluate the individual in the context of the group’s effort and achievement. Provide prompt feedback.
12. Reward the group for successful completion of its task. After evaluation, recognition and rewards should be given on a group basis so that individuals come to realize that they benefit from each other’s work and will help each other succeed.

GROUP ASSIGNMENTS

Group 1	Group 2	Group 3
4 students	4 students	4 students

Group 4	Group 5	Group 6	Group 7
4 students	4 students	4 students	4 students

Note: The group assignments are for the entire semester unless negotiated directly with the instructor or a change in section number necessitates a change in composition.

COURSE GRADING

The course grade is based upon the following:

1. Peer group assessment: 10%
2. Group assignments: 20%. Each group will turn in one worksheet completed jointly by all group members.
3. Course exams: 70%. There will be 4 written exams of 100 points each using a multiple choice and matching format. The same exams will be given to both the cooperative learning group and the lecture group.
4. Group grade incentives: If all members of an individual group receive greater than 80% on the written exams, each member will receive two (2) bonus points.

Grading Policy

The faculty of the Physician Assistant Department has adopted the following grading scale for all PHAS classes:

A	93 - 100%
A-	90 - 92%
B+	87 - 89%
B	83 - 86%
B-	80 - 82%
C+	77 - 79%
C	73 - 76%
C-	70 - 72%

A "C-" is the lowest acceptable grade for progression in the program.

Each member of this section must individually receive a minimum of 70% on the written exams to pass the course. This does NOT include the group assignments or the group grade incentives. This is a stand-alone requirement to pass. The course grade may be reduced under the following circumstances:

1. Repeated absences
2. Failure to participate in three (3) or more group assignments in class.
3. Test Absence

Failure to show up for a scheduled exam in ANY PHAS course does not automatically grant the student the right to take the exam at a later date. Students may petition the department for permission to take a make-up examination if they meet the following criteria:

notification of absence to the appropriate department/instructor PRIOR to the scheduled exam. However, there will be an automatic 10% reduction for that test if it is rescheduled. See PA student policies.

Repeated missing of exams (more than 2) in ANY PHAS COURSE, for any reason, will result in a maximum test score of 75% for the examination missed.

Failure to gain the appropriate departmental permission will result in a zero score for the examination missed.

Peer Group Assessment Tool

This tool will be used to assess each member's contribution to the group. In cooperative learning sometimes members of a group may allow the other group members to take charge and perform all the work. This is called social loafing. This is an opportunity for you to evaluate each member of your group. Please do not discuss the survey or your proposed rating with other group members. Your rating and other comments are strictly confidential. This rating system was developed by a professor at Walden University. Each day you will turn in the peer group assessment tool at the conclusion of each class session. The cumulative scores that you receive from the other group members will comprise 10% of your course grade.

Peer Group Assessment Tool

To be an effective member of any group requires members to exercise certain responsibilities with the group. Please evaluate each member of your group by name, using the following rating scale:

1. Significantly poorer than I expected
2. Poorer than I expected
3. Met my expectations
4. Better than I expected
5. Significantly better than I expected

Answer the following questions for EACH member of your group (do not include yourself) using the above scale:

- Q1: My team member devoted time to the group.
- Q2: My team member actively contributed to the quality of the decisions of the group made.
- Q3: My team member actively contributed to keeping the group focused through effective leadership.
- Q4: My team member provided task behaviors to keep the group focused.
- Q5: My team member provided appropriate relationship behavior to the group members.

Your input is strictly confidential between you and me. Please submit to an input box in the PA office within two (2) days of the class session.

Class topic: _____

Class date: _____

Name of Team Members

Rating for questions 1-5

	Q1	Q2	Q3	Q4	Q5
1.					
2.					
3.					
4.					

CLASS SCHEDULE - Fall 2001

Date/Day	Topic	Case Study Assignment	Reading Assignment
Sept. 26/Wed.	Introduction to clinical medicine and medical decisions	Clinical decision making	1, 2, 22
Oct. 1/Mon	Rheumatology topics	Rheumatology cases	181, 284, 285, 286, 287, 289, 290, 291, 292, 293, 294,
Oct. 3/Wed.	Rheumatology topics	Rheumatology cases	See above
Oct. 8/Mon.	Osteoarthritis/septic arthritis/pseudogout/gout/Lymes Disease	Arthritis cases	288, 299, 300, 302
Oct. 10/Wed.	Common, musculoskeletal disorders	Common musculoskeletal disorders	303, 306 handout
Oct. 15/Mon.	TEST 1*		
Oct. 17/Wed.	Disorders of the eye	Eye cases	512, 513
Oct. 22/Mon.	Disorders of the ear, nose, throat	ENT cases	515, 517
Oct. 24/Wed.	Disorders of the ear, nose, throat	ENT cases	375, 376, 379
Oct. 29/Mon.	HIV/AIDs	HIV/AIDs cases	406-410
Oct. 31/Wed.	HIV/AIDs	HIV/AIDs cases	406-410
Nov. 5/Mon.	Skin, muscle/bone infections	Skin, muscle, bone infection cases	522-531
Nov. 7/Wed.	TEST II*		
Nov. 12/Mon.	Evaluation of the patient with respiratory disease	PFT cases	72, 73
Nov. 14/Wed.	Asthma occupation lung disease	Asthma cases, occupational lung disease cases	74, 79
Nov. 19/Mon.	COPD Sarcoidosis	COPD Sarcoidosis cases	75, 77, 81
Nov. 26/Mon.	TB Pneumonia	TB, Pneumonia cases	82, 319-323, 358
Nov. 28/Wed.	TEST III*		
Dec. 3/Mon.	Lung cancer Lung abscess	Lung mass cases	85, 83, 81
Dec. 5/Wed.	Respiratory failure	Respiratory failure cases	88

**Final exam will be comprehensive

*Topics for tests TBA - all will have equal amount of topics.

APPENDIX D

EXAMPLE OF
COOPERATIVE LEARNING
GROUP ASSIGNMENT

COOPERATIVE LEARNING GROUP ASSIGNMENT

Topic: Minor Musculoskeletal Systems

Group Members: 1. _____
2. _____
3. _____
4. _____

1. A 26-year-old weakened athlete was playing football at the student-sponsored event when he fell hard on his left shoulder. He now presents with inability to abduct the arm. He has to shrug his arm to compensate for a loss of function.
 - A. What physical exam technique can assist in the diagnosis?

 - B. What is the most likely diagnosis and the differential diagnosis of this patient?

 - C. What diagnostic tests are helpful in the diagnosis (include Radiology)?

 - D. Outline the basic management of this patient.

2. A 34-year-old factory worker presents with pain in the front of the shoulder. He engages in repetitive activity on this job site upon physical exam you note tenderness in the bicipital groove.
 - A. What is your diagnosis?

 - B. Following two weeks of NSAID therapy your patient returns with a history of a “pop” and now a bulge in the antecubital fossa. What has happened and how should this be treated?

3. A 23-year-old female PA student presents with complaints of a “sac” or bulge over the elbow. She states she has been learning a lot on the elbow while studying for her numerous exams. Exam reveals a fluctuant mass over the elbow.
 - A. What is the diagnosis?

 - B. What are the potential etiologies of the condition and possible complicating factors?

 - C. How should this condition be treated (Be very specific)?

 - D. Describe the procedure that should be employed in this condition.

4. A 36-year-old male presents with swelling of his knee. There has been no trauma, fever, or chills. Physical exam is suspicious for possible “fluid on the knee”.
 - A. Describe physical exam techniques to assess for possible effusion.

 - B. Describe how you would manage this patient (be specific).

 - C. Describe complications of any procedures you might perform on this patient.

 - D. What are the possible elements examined in the fluid obtained from this knee. Include potential disease processes described.

5. A 26-year-old employee of General Motors presents with pain in her elbow. She points to an area of the lateral aspect of the elbow joints where the pain is most intense.
 - A. Describe the physical exam techniques used to assist in the diagnosis of this condition.

 - B. What is the differential diagnosis of this condition?

 - C. How would you manage this patient initially and in the event that initial therapy fails?

6. A 28-year-old female presents with complaints that her arm and hand will “go to sleep” at times also she experiences intensification of the pain in the hand and arm at night.
- A. What further questions should be asked about the location of the hand numbness that will aid in the diagnosis?

 - B. What anatomical distribution is the symptom usually found in this condition?

 - C. What physical exam techniques will help increase the suspicion that this patient has the condition?

 - D. What tests are definitive to diagnose this condition?

 - E. What are the initial management and long term management if conservative management fails?

APPENDIX E

SYLLABUS

PHAS 203

Principles of Medicine I
Fall 2001

Class meeting time: Monday 3:30-5:20pm
Wednesday 3:30-5:20pm

3 credit hours
Section 02

Classroom: G-28

Course Director: Scott L. Massey, MS, PA-C
E-mail: scott.massey@kmcnetwork.org

Selected Guest Lecturers: Mike Storer BA, PA-C
Millie Roach MS, PA-C
Mona Sedrak MS, PA-C

Textbook: Cecils Textbook of Medicine, 21st Edition

Course Description PHAS 203

A study of common medical and /or surgical disorders encountered in general adult medicine. Includes typical clinical presentation, etiology pathophysiology diagnostic work-up and management of these disorders.

Instructional Methods

Didactic Lecturers
Handouts
Reading from textbooks

Test Absence

Failure to show up for a scheduled exam in ANY PHAS course does not automatically grant the student the right to take the exam at a later date. Students may petition the department for permission to take a make-up examination if they meet the following criteria:

Notification of absence to the appropriate department/instructor PRIOR to the scheduled exam. **However, there will be an automatic 10% reduction for that test if it is rescheduled.** See PA student policies.

Repeated missing of exams (more than 2) in ANY PHAS COURSE, for any reason, will result in a maximum test score of 75% for the examination missed.

Failure to gain the appropriate departmental permission will result in a zero score for the examination missed.

Course Grading

The course grade will be based upon the following elements:

4 written exams (100 points each)

Final exam will be comprehensive

The final grade is based upon the number of points obtained divided by the total points possible x100.

Students must achieve 70% in the written exams to pass the course. Failure to achieve 70% in either area will result in the failure of the course.

Grading Policy

The faculty of the Physician Assistant Department has adopted the following grading scale for all PHAS classes:

A	93-100%
A-	90-92%
B+	87-89%
B	83-86%
B-	80-82%
C+	77-79%
C	73-76%
C-	70-72%

A "C-" is the lowest acceptable grade for progression in the program.

CLASS SCHEDULE -FALL 2001

Date/Day	Topic	Lecturer	Assignment
Sept. 26/ Wed.	Introduction to clinical medicine and clinical decision making	Massey	1, 2, 22
Oct. 1/Mon.	Rheumatology topics	Massey	282, 284, 285, 286, 287, 289, 290, 291, 292, 293, 294
Oct. 3/Wed.	Rheumatology topics	Massey	See above
Oct. 8/ Mon.	OA/ Septic arthritis/Gout, Psuedogout, Lymes Disease	TBA	288, 299, 300, 302
Oct. 10/Wed.	Common Musculoskeletal Disorders	Storer	303, 306, Handout
Oct. 15/Mon.	Test I*		
Oct. 17/Wed.	Disorders of the Eye	Storer	512, 513
Oct. 22/Mon.	Disorders of the Ear, Nose, and Throat	Roach	515, 517
Oct. 24/Wed.	Disorders of the Ear, Nose, and Throat	Roach	375, 376, 379
Oct. 29/Mon.	HIV/AIDS	Bacheller	406-419
Oct. 31/Wed.	HIV/AIDS	Bacheller	406-419
Nov. 5/Mon.	Skin/Muscle/Bone Infections	Massey	522-531
Nov. 7/Wed.	Test II*		
Nov. 12/Mon.	Evaluation of Patient with Respiratory Disease	Hill	72, 73
Nov. 14/Wed.	Asthma, Occupational Lung Disease	Massey	74, 79
Nov. 19/Mon.	COPD, Sarcoidosis	Roach	75, 77, 81
Nov. 26/Mon.	TB, Pneumonia	Massey	82, 358, 319-323
Nov. 28/Wed.	Test III*		
Dec. 3/Mon.	Lung Cancer/Lung Abscess	Massey	81, 83-85
Dec. 5/Wed.	Respiratory Failure/Pulmonary Embolism	Storer	88, 84

** Final Exam will be comprehensive

* Specific topics for each topic will be announced. Each test will have equal amount of topics

APPENDIX F
EXAMPLE OF COGNITIVE TEST

PHAS 213
ADULT MEDICINE I
TEST II

Name _____

Instructor - Scott Massey
November 8, 2001

1. Your patient complains of a palpable, well-defined subcutaneous nodule within the upper eyelid. Exam reveals a blocked meibomian gland of the upper lid with swelling and mild redness. INITIAL treatment would consist of which of the following?
 - a. warm compresses and massage over the lesion
 - b. steroid injection into the lesion
 - c. lubrication of the affected eye with artificial tears
 - d. incision and curettage of the lesion
 - e. systemic antibiotics

2. A 30-year-old man presents to the primary care clinic with a 1-day history of unilateral conjunctival redness and irritation, a mucoid discharge, and eye pain with mild photophobia. He denies any trauma. On physical exam, you notice an acutely red eye with discharge and tearing. Small vesicles were noted on the eyelid and lid margins. A slit-lamp examination after fluorescein dye shows multiple corneal ulcers, and some that form branching epithelial (dendritic) ulcers. Your patient MOST likely has:
 - a. chlamydial conjunctivitis
 - b. Sjögren's syndrome
 - c. hyperacute bacterial conjunctivitis secondary to *Neisseria gonorrhoeae*
 - d. herpes simplex viral (HSV) conjunctivitis
 - e. monilial conjunctivitis secondary to HIV infection

3. Topical ophthalmic corticosteroids are indicated for inflammatory conditions of the eye for all of the following conditions EXCEPT:
 - a. allergic conjunctivitis
 - b. herpes simplex keratitis
 - c. uveitis
 - d. episcleritis

4. Painless red eye(s) suggests:
 - a. conjunctivitis
 - b. corneal injury/infection
 - c. iritis
 - d. acute glaucoma
 - e. open-angle glaucoma

5. Bacterial conjunctivitis:
 - a. has a mucopurulent discharge
 - b. exhibits seasonal recurrence
 - c. has severe pain
 - d. causes loss of vision
 - e. is associated with URI symptoms

6. A 45-year-old black man presents complaining of severe pain and decreased vision in

- both eyes for 1 day. On exam, you note ciliary flush, essentially normal conjunctiva, and cloudiness of the cornea with fixed, mid-dilated pupils. You suspect:
- acute bacterial conjunctivitis
 - allergic conjunctivitis
 - iritis
 - cataract
 - acute glaucoma
7. A 44-year-old, previously healthy male presents with a sudden onset of fever, acute pain and warmth around the eyes, diffuse lid swelling, decreased vision, and double vision. Prior history indicates moderate to severe infraorbital pain for the past 3 days associated with the patient's seasonal allergies. Of the following, the MOST appropriate INITIAL diagnosis would be:
- orbital cellulitis
 - conjunctivitis
 - uveitis
 - herpes simplex keratitis
8. A 44-year-old male presents with ocular pain of acute onset, decreased vision, haloes around lights, and nausea. The intraocular pressure is greater than 40 mmHg, the conjunctiva is injected, the cornea is cloudy, and the pupil is in the mid-dilated position and minimally reactive. Visual acuity is reduced. You suspect:
- cataract
 - amaurosis fungus
 - herpes simplex keratitis
 - angle-closure glaucoma
9. What is MOST likely the etiology for sudden loss of vision when there is no apparent cause?
- vascular compromise
 - infection
 - retinal detachment
 - neurologic degeneration
10. A 48-year-old woman has severe pain and blurred vision in the left eye. She also sees halos around lights and has photo-phobia. She has had nausea and vomiting for the past two hours. Her eye is red, the cornea appears hazy, and the pupil is nonreactive to light. Of the following, which is the most likely diagnosis?
- Acute angle-closure glaucoma
 - Cavernous sinus thrombosis
 - Central retinal vein occlusion
 - Retinal detachment
 - Retinal hemorrhage

11. The drug class most commonly responsible for drug-induced cataracts is:
 - a. atropine
 - b. beta-blockers
 - c. mydriatic drugs
 - d. corticosteroids

12. A 60-year-old woman relates progressive painless reduction of vision in both eyes over the previous 6 months. She reports that vision seems impaired in bright sunlight and while driving at night. She denies any medical problems. On examination, her visual acuity measures 20/50 and her eyes appear quiet. The most likely diagnosis is which of the following?
 - a. corneal abrasion
 - b. retinal detachment
 - c. cataract
 - d. acute angle closure glaucoma
 - e. central retinal artery occlusion

13. A 30-year-old woman presents herself with a 3-day history of a unilateral red eye. The vision is decreased and there is significant light sensitivity (photophobia). There is a mucus-type discharge present. She had the "flu" with fever 2 weeks earlier. There is no history of exposure to an individual with a red eye, no history of contact lens wear, and no other associated nonocular findings. Past medical history is positive for herpes simplex virus labialis and hayfever. What is the best course of action?
 - a. Gentamycin ophthalmic solution q.i.d. for presumed bacterial conjunctivitis
 - b. Cool compresses and observation for presumed viral conjunctivitis
 - c. Ophthalmologic referral for presumed acute angle closure glaucoma
 - d. Ophthalmologic referral for presumed herpes simplex virus-related ocular disease
 - e. Observation and topical antihistamines for presumed allergic conjunctivitis

14. A mother of a child in daycare presents herself with a unilateral red eye, 5 days after her son begins topical ocular antibiotics for a bilateral red eye. Although the vision is not decreased, there is significant mucopurulent discharge. Her son had resolution of symptoms in 2 days. What is the most likely diagnosis?
 - a. bacterial conjunctivitis
 - b. viral epidemic conjunctivitis
 - c. herpes simplex virus conjunctivitis
 - d. fungal conjunctivitis
 - e. allergic conjunctivitis

15. What would the best management for this patient be?
 - a. routine bacterial culture of the eyelids followed by a 7 to 10 day course of oral antibiotics
 - b. hot soaks to the eyelids bid with a topical Gram-positive antibiotic ointment applied to both lids once a day
 - c. viral culture of the eyelids
 - d. herpes simplex virus culture of the eyelids
 - e. send the patient home with a topical anesthetic qid with scheduled ophthalmology follow up in 1 week

16. In almost all chemical burns, whether to skin or eyes, the cornerstone of initial treatment is:
 - a. careful identification of the offending agent
 - b. a search for the appropriate neutralizing agent
 - c. hydrotherapy
 - d. analgesics

17. A 35-year-old man presents with painful loss of vision while using a grinding wheel with no eye protection. A metallic foreign body is demonstrated in the globe by x-ray. This patient should:
 - a. be protected with an eye shield and referred to ophthalmologist immediately
 - b. have antibiotics instilled, patched, and followed by ophthalmologist
 - c. have tetanus updated, systemic antibiotics, and followed by primary care provider
 - d. have tetanus updated, topical antibiotics, and followed by ophthalmologist
 - e. have antibiotics instilled, patched, and followed by primary care provider

18. A well 20-year-old man presents with sudden unilateral loss of vision after a "hit" in a rugby game. This presentation is MOST likely:
 - a. central retinal artery occlusion
 - b. cataract
 - c. glaucoma
 - d. temporal arteritis
 - e. detached retina

19. A 40-year-old male construction worker complains of a yellow-red lesion in the nasal sclera that has begun to interfere with his vision; you diagnose:
 - a. pterygium
 - b. pinguecula
 - c. subconjunctival hemorrhage
 - d. arcus senilis
 - e. episcleritis

20. Splenomegaly in a patient with pharyngitis suggests
 - a. gonococcal infection
 - b. diphtheria
 - c. Epstein-Barr virus
 - d. Coxsackie A virus
 - e. group A beta-hemolytic strep (*S. pyogenes*)

21. A good first choice antibiotic for OM in children is
 - a. penicillin
 - b. erythromycin
 - c. amoxicillin/clavulanate (Augmentin®)
 - d. amoxicillin
 - e. cefaclor (Ceclor®)

22. Patients with epistaxis who require immediate ENT referral include those requiring:
 - a. any nasal packing
 - b. silver nitrate cautery
 - c. phenylephrine or oxymetazoline
 - d. posterior nasal packing
 - e. oxidized surgical cellulose

23. Management of infectious mononucleosis includes
 - a. instructing the patient to avoid contact sports or strenuous exercise
 - b. rest during the acute phase and gradual return to normal activity
 - c. symptomatic treatment of fever and pharyngitis
 - d. penicillin or erythromycin for treatment of bacterial pharyngitis
 - e. all of the above

24. The MOST common predisposing risk factor for otitis media in children is
 - a. day-care attendance
 - b. adenoidal hypertrophy
 - c. upper respiratory infections
 - d. tonsillar hypertrophy

25. The MOST common etiology of bacterial sinusitis is
 - a. *Streptococcus pneumoniae*
 - b. *Staphylococcus aureus*
 - c. *Moraxella catarrhalis*
 - d. group A beta-hemolytic *Streptococcus*

26. The following are complications of sinusitis EXCEPT
 - a. meningitis
 - b. periorbital cellulitis
 - c. peritonsillar abscess
 - d. osteomyelitis

27. You treat a 24-year-old man for acute strep pharyngitis with 10 days of erythromycin 250 mg QID. On day 9 of treatment, he calls, stating in a muffled voice, "I am running a fever of 101 today. What should I do?" You advise:
 - a. appropriate measures for fever and pain control, follow-up in office tomorrow if still febrile
 - b. appropriate measures for fever and pain control, follow-up in office tomorrow regardless
 - c. appropriate measures for fever and pain control, phone in 7 more days of erythromycin
 - d. coming in to office for evaluation immediately if fever exceeds 103°F
 - e. coming in to office for evaluation immediately

28. Proven strep pharyngitis in a patient with no drug allergies is treated with:
- pen VK 250 mg PO QID x 10 days
 - erythromycin 250 mg PO QID x 10 days
 - Doxycycline 100mg BID x 10 days
 - Suprax 50 mg TID x 10 days
29. Warning signs of complications of acute sinusitis may include:
- purulent nasal discharge, pain increased leaning forward
 - high fever, lid edema, proptosis
 - toothache, opacity on transillumination
 - thickened mucosa on x-ray, positive nasal culture
 - air-fluid levels on x-ray, tenderness to percussion
30. The MOST frequent cause of nosebleeds is:
- granulomatous disease
 - neoplasm
 - hypertension
 - local trauma
 - coagulopathy
31. The MOST common class of etiologic agents for upper respiratory tract infections in children is:
- mycoplasmal
 - viral
 - bacterial
 - fungal
 - parasitic
32. A 19-year-old female presents complaining of runny nose, sneezing, HA, mild sore throat, myalgia, and fullness in her ears. Physical exam reveals a temperature of 100.5°, mild erythema of pharynx, clear, watery nasal discharge, clear T/Ms and chest (to auscultation). The clinical picture most suggestive is:
- allergic rhinitis
 - common cold
 - sinusitis
 - beta hemolytic strep pharyngitis
 - viral pneumonia
33. A 24-year-old female graduate student has had a sore throat and tender cervical adenopathy, which have persisted for the past 2 weeks. Although the student specifically denied being allergic to ampicillin, she developed a diffuse skin rash after treatment with this medicine. Examination was also remarkable for petechiae near the soft palate, severe exudative pharyngitis, and generalized lymphadenopathy.
- Streptococcal pharyngitis
 - infectious mononucleosis
 - adenoviral pharyngitis
 - oral thrush
 - Vincent's angina/trench mouth

34. A 15-year-old female is seen in the office c/o a moderately severe sore throat and fever X 1 day. She denies cough, runny nose, earache or SOB. On PE you find a temperature of 103°, enlarged anterior cervical nodes and an exudative pharyngitis. The lung are clear and there is no hepatosplenomegaly. Her symptoms are MOST SUGGESTIVE of:
- peritonsillar abscess
 - adenovirus
 - common cold
 - group A beta hemolytic strep
 - influenza A
35. Which of the following is considered the drug of choice for the patient? (refer to question 34).
- tetracycline
 - gentamicin
 - ampicillin
 - Pen VK
 - none of the above

MATCHING: For questions 36-41 match the MOST COMMON organism on the right, with the type of infection on the left. The choices may be used once, more than once, or not at all. There is only one correct answer.

- | | | |
|---------------------|-------|-----------------------|
| 36. mononucleosis | _____ | a. Epstein-Barr virus |
| 37. thrush | _____ | b. Group A strep |
| 38. rheumatic fever | _____ | c. Strep pneumonia |
| 39. sinusitis | _____ | d. Orthomyxovirus |
| 40. Otitis Media | _____ | e. Candida albicans |
| 41. Influenza | _____ | |

42. A patient with signs/symptoms of influenza improves for several days and then rapidly starts becoming toxic with chills, fever, dyspnea, and productive cough. The MOST LIKELY cause is:
- flare-up of influenza
 - development of influenza pneumonia
 - a secondary bacterial pneumonia
 - a viral sepsis
 - bacterial meningitis

MATCHING: For questions 43-45 match the following signs/symptoms with the MOST LIKELY etiology organism or diagnosis.

- a. candida (thrush)
 - b. corynebacterium diphtheria
 - c. beta hemolytic strep
 - d. rhinovirus
 - e. Vincent's infection (fusiform/spirochete)
43. _____ Dirty grey-white exudate covering tonsils, uvula, and pharynx that may lead to respiratory obstruction and bleeds when separated from mucosa.
44. _____ Painful gingivitis/pharyngitis with superficial gray/brown membrane of gums and pharynx.
45. _____ Fever, polyarthritits, high ESR, subcutaneous nodules.
46. Treatment of acute otitis media in children could include any of the following EXCEPT:
- a. amoxicillin
 - b. tetracycline
 - c. erythromycin and sulfisoxazole
 - d. trimethoprim-sulfamethoxazole
 - e. cefaclor
47. The primary cause of morbidity and mortality in diphtheria is:
- a. ulcerative lymphadenopathy
 - b. CNS spread
 - c. aspiration of grey pseudomembrane
 - d. cardiac arrest
48. An 18-year-old female who is sexually active was seen in the student health clinic 1 week ago for a sore throat. A streptococcal antigen test was positive, and she was given a prescription for oral penicillin. After 3 days, she stopped her medication because she felt better. She now presents with a severe sore throat. On physical examination, she has a temperature of 102.6°F (39.2°C), marked pharyngeal erythema, medial deviation of the soft palate on the left, tender left anterior cervical adenopathy, and a "hot potato" voice. The rest of her history and physical examination are unremarkable. Which of the following is the most likely diagnosis?
- a. recurrent streptococcal pharyngitis
 - b. infectious mononucleosis
 - c. gonococcal pharyngitis
 - d. peritonsillar abscess
49. Which of the following are the most common pathogens in adult acute sinusitis?
- a. *Staphylococcus aureus* and anaerobes
 - b. *Staphylococcus aureus* and rhinovirus
 - c. *Streptococcus pneumoniae* and anaerobes
 - d. *Haemophilus influenzae* and *Streptococcus pneumoniae*

50. A 7-year-old child develops severe pharyngitis. On physical examination, the child is febrile with a temperature of 103°F (39.4°C), has purulent tonsillitis and anterior cervical adenopathy. Which of the following is the LEAST likely etiological agent?
- adenovirus
 - Epstein-Barr virus
 - Staphylococcus aureus
 - group A beta-hemolytic streptococci
51. Which of the following findings in a patient with acute pharyngitis is most suggestive of a life-threatening condition?
- drooling
 - high fever
 - loss of appetite
 - vomiting
 - watery, red eyes
52. A patient with symptoms of sinusitis develops periorbital edema, ptosis, and decreased extraocular movements. The most appropriate treatment is:
- antibiotic eyedrops
 - decongestant nasal sprays
 - intravenous antibiotics
 - intravenous corticosteroids
 - warm compresses over the eyes

MATCHING (Questions 53-57). Pick the one best answer.

- cataract
 - retinoblastoma
 - amaurosis
 - temporal arteritis
 - strabismus
53. _____ Condition often seen in older people, presents with myalgias, fever and scalp pain.
54. _____ Transient unilateral vision loss due to embolism.
55. _____ May present with "squinting" and a "white" light reflex on funduscopy.
56. _____ Diagnosis may be made with cover-uncover test or light reflex test.
57. _____ Slowly progressive visual loss including blurring and loss of color perception.

58. An 18 year old female who is sexually active was seen in the student health clinic 1 week ago for a sore throat. A streptococcal antigen test was positive, and she was given a prescription for oral penicillin. After 3 days, she stopped her medication because she felt better. She now presents with a severe sore throat. On physical examination, she has a temperature of 102.6°F (39.2°C), marked pharyngeal erythema, medial deviation of the soft palate on the left, tender left anterior cervical adenopathy, and a “hot potato” voice. The rest of her history and physical examination are unremarkable. Which of the following is the most likely diagnosis?
- recurrent streptococcal pharyngitis
 - infectious mononucleosis
 - gonococcal pharyngitis
 - peritonsillar abscess

MATCHING (Questions 59-61)

- acute iritis
 - corneal trauma or infection
 - acute glaucoma
 - acute conjunctivitis
59. _____ watery discharge, slightly blurred vision, small pupils with poor pupillary reaction
60. _____ copious mucoid discharge, diffuse conjunctival injection, clear cornea
61. _____ watery to purulent discharge variably blurred vision, moderate to severe pain
62. A 32 year-old male presents to the physician's office with a painful red warm streak along his right forearm. He was involved in an altercation with his girlfriend the night before and she had scratched him on the right arm. He also has a painful enlarged gland in his right axilla. This young man most likely has a:
- Folliculitis
 - Ecthyma
 - Cellulitis
 - Lymphangitis
63. The causative agent of the above condition is probably:
- Group B strep
 - Group A strep
 - Staph aureus
 - B or C or both
 - All the above

MATCHING (Questions 64-66) Match the characteristics with the appropriate disorder.

- clostridial myonarcosis
 - tetanus
 - necrotizing fasciitis
 - bacteroides
64. _____ rigidity with convulsive spasms caused by a neurotoxin
65. _____ life threatening infection with bacteremia following a traumatic injury to a lower extremity
66. _____ x-ray of left leg shows gas in soft tissue

MATCHING (Questions 67-70). Match the clinical characteristics/patient profile or etiological organisms with the most correct diagnosis.

- a. lymphangitis
- b. erysipelas
- c. bullous impetigo
- d. impetigo contagiosa
- e. Ecthyma

67. _____ "Honey colored" stuck on crusts
 68. _____ "Staph aureas Phage Group II or Type 71 coagulase (+)
 69. _____ "Punched out" crusted lesions, often on shins
 70. _____ Red, hot, painful, indurated lesion, often on the face

71. Impetigo is a:
 a. Fibrotic lesion that forms pustules
 b. Scaling skin lesion that forms honey crust
 c. localized area of vitiligo
 d. vesicopustular skin infection that ruptures and forms honey colored crusts

MATCHING (Questions 72-75). Match the following condition with the appropriate treatment of choice.

- a. Benzathine penicillin
- b. Ceftriaxone with Doxycycline
- c. Ciprofloxacin
- d. Erythromycin 500 quid x 7 d
- e. Metronidazole

72. _____ chancroid
 73. _____ Trichomonas Vaginalis
 74. _____ Gonorrhoea
 75. _____ Syphilis

MATCHING (Questions 76-84). Match the etiological organism (most common) with the most correct diagnosis.

- a. Group A Beta hemolytic
- b. Staph aureus
- c. Corynebacterium
- d. Pasteurella
- e. Pseudomonas aeruginosa

76. _____ Bullous Impetigo
 77. _____ Cat Bites
 78. _____ Ecthyma
 79. _____ Erysipelas
 80. _____ Cellulitis
 81. _____ Lymphangitis
 82. _____ Hot tub folliculitis
 83. _____ Impetigo contagiosa
 84. _____ Erythrasma

MATCHING (Questions 85-89). Match the condition with the appropriate causative organism.

- a. Spirochete
- b. Poxvirus
- c. Chlamydia Trachomaxes
- d. Gram negative diplococci
- e. Gram negative bacillus

- 85. _____ gonorrhoea
- 86. _____ syphilis
- 87. _____ Lymphogranuloma Venereum
- 88. _____ Molluscum contagiosum
- 89. _____ Granuloma inguinale

MATCHING (Questions 90-94)

- a. Gardnerella vaginalis
- b. Gram negative ROD
- c. Human Papilloma virus
- d. Protozoa
- e. Candida albicans

- 90. _____ Trichomonas Vaginalis
- 91. _____ Condylomata Acuminata
- 92. _____ Monilial Vaginitis
- 93. _____ Chancroid
- 94. _____ Vaginosis

MATCHING (Questions 95-97). Match the clinical manifestations/characteristics with the BEST answer.

- a. furuncle/carbuncle
- b. folliculitis
- c. erythrasma
- d. toxic shock syndrome

- 95. _____ woods light-core red
- 96. _____ diffuse erythroderma
- 97. _____ cavernous sinus thrombosis can occur if located on facial triangle

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