CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

THE ASSOCIATION OF CRITICAL THINKING AND GRADE POINT AVERAGE IN ENTRY-LEVEL MASTERS DEGREE PHYSICAL THERAPY PROGRAM

A graduate project submitted in partial fulfillment of the requirements for the degree of Master of Physical Therapy

By

Sharmi Patel

in collaboration with Heather Andersen and Sandor Szilagyi

May 2002
The thesis of Sharmi Patel is approved:

George Wolfe, PhD, PT

Date

Sheryl A. Low, PT, MPH

Date

Beth Phillips Simpson, MPT, Chair

Date

California State University, Northridge
ACKNOWLEDGEMENTS

My sincere thanks and gratitude to everyone who has contributed to the completion of this project: Beth Simpson, for her patience and generosity, for her guidance and direction, and for her enthusiasm; Dr. George Wolfe for his support and statistical wisdom; and Sheryl Low for her support and insight.

I would also like to give my thanks to my parents and my brother whom I love dearly. Without their help, support, and unconditional love, I would not be the person I am today. They are my confidence, my strength, and my motivation to complete college and become a physical therapist. I love you guys very much!

Lastly, I would like to thank the students of Class 46 CSUN Physical Therapy Program for their participation in this study.

Sid Caesar once said, "In between goals is a thing called life, that has to be lived and enjoyed." I agree. You must never give up in striving to accomplish your dreams and goals. But at the same time, don't let your life pass you by. Never forget those who you love and those who love you back. Learn to forgive and forget. Don't let yesterday get in the way of today.
# TABLE OF CONTENTS

**SIGNATURE PAGE**  

**ACKNOWLEDGEMENTS**  

**ABSTRACT**  

**INTRODUCTION**  

**LITERATURE REVIEW**  

- Critical Thinking  
- Tools of Measurement for Critical Thinking  
- Watson-Glaser Critical Thinking Appraisal (WGCTA)  
- Grade Point Average (GPA)  
- WGCTA and GPA  
- GPA and Clinical Performance  

**METHODS AND MATERIALS**  

- Subjects  
- Instrumentation  
- Research Design  
- Procedure  

**DATA ANALYSIS**  

**RESULTS**  

**DISCUSSION**  

**CONCLUSION**  

**REFERENCES**
APPENDICES

A. Subject Consent Form 29

B. Rights of Human Subjects in Medical Experiments 31

C. Instructions and Examples of the Different Subtests for the Watson-Glaser Critical Thinking Appraisal 32
ABSTRACT

THE ASSOCIATION OF CRITICAL THINKING AND GRADE POINT AVERAGE IN ENTRY-LEVEL MASTERS DEGREE PHYSICAL THERAPY PROGRAM

by

Sharmi Patel

Master of Physical Therapy

Background and Purpose. The ability for physical therapists to think critically is essential in making correct clinical judgments. The purpose of this study was to determine if an association exists between critical thinking skills measured by the Watson-Glaser Critical Thinking Appraisal Tool (WGCTA) and prerequisite and first semester professional program grade point averages (GPAs). WGCTA scores and GPA information were collected from first year students enrolled in entry-level MPT program at California State University, Northridge (CSUN). Subjects. Twenty-nine physical therapy students (9 males, 20 females), chosen by sample of convenience, enrolled in the first-year (2001) physical therapy program at CSUN volunteered for this study. The subjects’ ages ranged from 20 to 35 years old. Method. The students consented to participation in the study and completed Form A of the WGCTA at the start of fall semester 2001. The chair of the study issued a coded number to each student’s name to insure confidentiality. Results. The Pearson correlation for the Watson-Glaser score and prerequisite GPA was $r = 0.037$. The Pearson correlation for the Watson-Glaser score and first semester professional program GPA was $r = 0.317$ ($p < 0.05$). The Pearson correlation between prerequisite and first semester professional program GPAs was
Discussion. There is no association between first semester professional program GPA and WGCTA scores. Prerequisite GPA and WGCTA scores have no association. There is a weak association between prerequisite GPA and first semester professional program GPAs. Conclusion. We conclude that prerequisite GPAs and first semester GPAs were not an effective tool to predict WGCTA scores in physical therapy students at CSUN. The WGCTA is not an effective standardized test to assess the critical thinking skills in PT students and is probably not the most useful tool to have as potential admission criteria into the program. Further investigation and development of an instrument to measure critical thinking skills in a clinical setting is merited.
INTRODUCTION

As understanding of human diseases and knowledge of medical technology rapidly increases, the role of critical thinking in diagnosis and treatment becomes more important. A widely accepted definition of critical thinking, as described by Watson and Glaser, is an attitude of inquiry involving identification of problems and a need for supportive evidence, knowledge of the nature of valid inferences, abstractions, and generalizations, and skills for applying this knowledge and attitude.\(^3^3\) Health professionals “must be able to make critical clinical judgments and life-saving decisions, solve highly complex problems, and think critically.”\(^2^9\) Despite the importance of critical thinking skills, it is rarely used as a selection criterion for admission into health professions education program. Instead, grade point average (GPA) is most frequently used as an admission criterion into such educational programs, including physical therapy. Education programs need selection criteria that are accurately predictive of academic and clinical success.

Clinicians, including physical therapists, realize that making clinical decisions requires practice and judgment. May et al, in a study of physical therapist education, used a model developed at Alverno College in Wisconsin to evaluate noncognitive behaviors.\(^1^8\) According to this model, physical therapy students must be able to demonstrate communication and problem-solving skills general in nature rather than specific to a discipline. According to Burnett and Pierson, “Physical therapy students must be prepared to make critical decisions related to patient care, allocation of resources, and the delivery of health care services.”\(^9\) According to Bella, physical therapists should be able to problem solve when it comes to patient care, research,
administration, professional activities and education. Problem solving includes ability to approach the problem, identify, analyze, and reason elements in a particular situation. Problem solving also includes developing alternate solutions, choosing the one that will be the most successful, evaluating the outcomes, and altering or modifying plan of action accordingly. Therefore, physical therapy programs need to foster critical thinking skills in students for optimal academic and clinical success. Educational programs may benefit from the ability to determine student applicants’ level of critical thinking skills or predict students’ potential for developing critical thinking. Since GPAs are the most frequently used admission criteria, it is important to explore the relationship between critical thinking and GPA to determine if one is predictive of the other or if evaluating critical thinking as a separate admission criteria is merited. The purpose of this study was to investigate if there is an association between critical thinking and prerequisite GPA and first semester professional program GPAs in physical therapy students.

In this study, the Watson-Glaser Critical Thinking Appraisal (WGCTA) was the instrument with which critical thinking was assessed. The WGCTA “has been reported to predict success in certain types of professions and instructional programs in which critical thinking is known to play an important role.” The WGCTA has been widely used in research conducted on the general population in a variety of professions to measure critical thinking abilities. However, only one notable published research has been done utilizing the WGCTA in physical therapy.
Specific Aims

1. To determine the association between critical thinking skills and professional program prerequisite grade point average of first year physical therapy students.
2. To determine the association between critical thinking skills and first semester professional program grade point average of first year physical therapy students.
3. To determine the association between prerequisite grade point average and first semester professional program grade point average of first year physical therapy students.

Research Hypothesis

There is a positive correlation between critical thinking skills as measured by the WGCTA tool and both prerequisite and first semester professional program of first year grade point averages of physical therapy students at California State University, Northridge.

LITERATURE REVIEW

Critical Thinking

Critical thinking is a construct concept with many definitions. The word ‘critical’ represents the ability to differentiate fact from fiction based on evidence. This ability is a necessity in any scientific field. Academic debates conducted by scientists consist of identifying discrepancies and logical flaws, analyzing proportions, and presenting
evidence to support any given argument. This constant critical approach is necessary in the scientific community. It enables researchers to verify and test existing theories.\textsuperscript{32}

Richard Paul points out that development of any type of thinking is a gradual process with plateaus.\textsuperscript{23} According to Paul, critical thinking develops through six stages. A person in the first stage is termed “The Unreflective Thinker.” During this stage, a person is unaware of significant problems in cognitive skills. This is because self-correcting, one of the traits of critical thinking, is not active in this stage. A person in stage two is called “The Challenged Thinker.” An individual at this stage has become aware of some problems with his or her critical thinking, but is unable or unwilling to act to improve the situation. Stage three represents “The Beginning Thinker”, who now is able to modify and link thinking abilities. However, the improvement is irregular. During stage four, “The Practicing Thinker”, an individual has recognized the necessity of regular improvement of critical thinking. Stage five represents “The Advanced Thinker”, a person whose skill has been improved due to regular practice. Finally, at stage six, The Master Thinker is the individual for whom skilled and insightful thinking has become second nature. At this level, the individual needs no conscious effort to improve or practice critical thinking. Paul describes “good thinking” as thinking that accomplishes its purpose. He views critical thinking as more than a set of skills. He states that it involves “virtues of mind” such as intellectual integrity, intellectual empathy, intellectual humility, intellectual courage, and intellectual perseverance.\textsuperscript{23}

Helliwell emphasizes four fundamental steps that he believes should occur in any decision making process: analysis of the problem with an understanding of the need for a decision; integration of available information based on its relative importance; use of
intuition along logic; and analysis of all potential positive and negative impacts of the
decision. Guest believes two of the major barriers in the development of reasoning
skills are the fear of getting things wrong and the inability to express ideas.

According to Burnard, critical thinking starts with comprehension of the material
under consideration. Burnard defines critical thinking as an ability to realize
alternatives, or discriminate and identify new ideas. Jones and Brown emphasize
problem solving ability in their definition of critical thinking. Oerman views critical
thinking as a tool which enables the health practitioner to analyze complex data about
patients. The practitioner may then make decisions about patients’ problems, consider
the priority of alternative possibilities, and choose the most appropriate interventions.

Among the numerous definitions of critical thinking, one of the most widely
quoted and highly recognized definitions in the literature proposes critical thinking to be
a “composite of knowledge, attitudes, and application skills.” The American
Philosophical Association (APA) has published a consensus definition of critical thinking
based on the views of forty-six critical theorists. The definition states:

“The ideal critical thinker is habitually inquisitive, well informed, trustful of
reason, open-minded, flexible, fair minded in evaluation, honest in facing
personal biases, prudent in making judgments, willing to reconsider, is clear
about issues, orderly in complex matters, diligent in seeking relevant
information, reasonable in the selection of criteria, focused in inquiry, and
persistent in seeking results which are as precise as the subject and
circumstances of inquiry permit.”

One of the many important criteria for accreditation of professional education
programs in physical therapy is closely related to critical thinking. The Commission on
Accreditation in Physical Therapy Education (CAPTE) carries out the evaluation process
for accrediting Physical Therapy Education programs. CAPTE is the only recognized
agency in the United States for accrediting educational programs for the preparation of physical therapists. CAPTE assures that accredited programs prepare graduates who will be effective practitioners of physical therapy. CAPTE guidelines for physical therapy schools state that the students must be able to demonstrate clinical decision-making in clinical settings based on critical thinking. Therefore, educational institutions incorporate critical thinking tasks in their professional preparation of physical therapy students. The importance of problem-solving ability and critical thinking in physical therapy was also documented by May and colleagues. They identified ten generic abilities which are important for physical therapy students by surveying clinical educators. The identified abilities are: commitment to learning, interpersonal skills, communication skills, effective use of time and resources, use of constructive feedback, problem solving, professionalism, responsibility, critical thinking, and stress management. Educators believe transition from classroom to the clinic is one of the most challenging tasks for physical therapy students. This process can be hindered by underdevelopment of critical thinking as one of the generic abilities. May and his colleagues suggest developing exercises to assess progress and to provide immediate feedback to students throughout the professional curriculum.

The question arises whether critical thinking can be taught to students and applied clinically. The faculty at the University of Helsinki decided to incorporate critical thinking into their curriculum after receiving promising results from pilot studies. They conducted a study of 88 four-year medical students who participated in seven 12-14 member groups with 25 faculty members serving as tutors. The courses in the curriculum consisted of five lectures and 15 hours of tutored group work. The students received
handouts that included clinical problems with instructions to study the material before participating in group work. The lectures covered Evidence Based Medicine (EBM). EBM is a systematic methodology of critically evaluating studies and considering their applicability in clinical practice. EBM was combined with Problem-Based Learning (PBL). PBL is an educational approach to develop critical thinking. This approach uses cases as stimuli to enhance self-directed study. One of the differences between EBM and PBL is that EBM also provides the 'solution' for each case. This allows the students to learn to critically evaluate the offered solution and to apply the evidence. The purpose of the EBM courses was to introduce students to the evidence-based method, to provide critical evaluation skills for clinical practice, and to provide support for effective use of this knowledge in patient care. The purpose of tutors was to generate Socratic-like questions in order to promote critical thinking. Upon completion of the courses, 80% of the students reported conceptional change in their medical knowledge. Only three students disliked the PBL method. Critical thinking abilities were not measured, however all faculty members who participated were satisfied with the results.24

The topic of critical thinking is controversial. Haroutian-Gordon attempted to describe and compare reports and theories regarding critical thinking.13 Her initial expectation was that there would be a disagreement regarding critical thinking among the researchers, however she reported that there is actually more convergence on the issue than it seems. One factor of curriculum design in the past has been to influence educators to focus on subject matter content when they teach rather than development of critical thinking. The content is usually far more specified than generic abilities. However, as a
result of recent research evidence the importance of critical thinking is widely recognized.\textsuperscript{13,18,24}

There is general agreement that critical thinking is essential for clinical practice of healthcare professionals. Most of the definitions of critical thinking in the clinical setting address clinical decision-making or clinical reasoning, but researchers fail to establish the relationship between these terms. The operational definition of critical thinking for this study was defined as a combination of cognitive skills which enables the students to analyze a given problem or task, to generate alternatives as possible solutions, and to analyze these solutions.

Tools of Measurement for Critical Thinking

Assessing critical thinking skills in students is a challenge in many health professions. Many instruments exist that are used for evaluating and measuring critical thinking. For this study, the WGCTA was used to assess the critical thinking skills of physical therapy students because it is thought to be general across different disciplines and has a well-established reliability and validity.

Watson-Glaser Critical Thinking Appraisal (WGCTA)

The WGCTA is a quantitative instrument that has been reported as being widely used to measure critical thinking abilities in nurses.\textsuperscript{2,3,11,19,28} The WGCTA has been reported to predict successful outcomes in certain professions or instructional programs, in which critical thinking plays an important role.\textsuperscript{3} The WGCTA consists of two forms; A and B, each containing 80 questions. Both forms, as suggested by Watson-Glaser, are
considered balanced for difficulty, content, correlation and are alternated to measure critical thinking. The WGCTA takes approximately 40 minutes to complete. For this study, Form A was administered to the first year physical therapy students. In a future longitudinal study, Form B will be administered to these same students in their third year to determine whether three years of physical therapy school influences critical thinking scores.

The 80 questions of the WGCTA are divided into five different subtests containing sixteen questions each. Subtest groups measure critical thinking as following: 1) Inferences—drawing reasonable conclusions by discriminating truth or untruthful inferences from given databases; 2) recognition of assumptions—the ability to recognize assumption or presuppositions in any statement, declaration or assertions given; 3) deductions—the ability to determine whether a conclusion follows pieces of information in given premises; 4) interpretation—the ability to analyze information and the evidence given to determine whether or not the conclusions or generalizations are valid; and 5) evaluation of arguments—being able to distinguish between strong, relevant arguments and weak, irrelevant arguments for a specific issue.

The exercises (test questions from the WGCTA) include problems, statements, and situations encountered in classrooms, at work on a daily basis, newspapers, magazines and other media. The test questions also consist of two different kinds of topics: "neutral" topics such as dealing with weather, disasters, and scientific facts, or "controversial" topics such as political, economical, and social issues that bring about strong feelings, opinions, or attitudes.
Adams et al identified WGCTA as being both a valid and reliable tool of assessing critical thinking skills. Reliability of WGCTA was assessed in several ways: by looking at the test's internal consistency, examining stability of test scores over time, and comparing correlation between scores on alternate forms. Estimates of internal consistency were measured by calculating split-half coefficients. The most often used method of split-half reliability involves using the even numbers to create one half-test and the odd numbers to create the second half-test. During one session, a group of subjects takes the test, and the questions are then divided into two comparable halves in order to be scored. The 16 questions on the inference subtest of the WGCTA were split so that questions 1-10 were included in the first split-half scores, and questions 11-16 were included in the second split-half scores. This resulted in each subject having two separate scores. Correlating the scores of the two halves of the test taken by the subjects assesses reliability. If each half-test result is highly correlated, then the entire test is considered reliable. This approach is called split-half reliability. For the WGCTA, questions related or similar in a given passage were kept together and questions from all five different subtests were represented on each of the two split-halves. Scores for each of the halves were calculated separately and the result scores were correlated using Spearman-Brown formula. The coefficient ranged from 0.69-0.85. Stability of responses over time were measured by administering the test twice to the same college student group (n=96) within a three-month interval. The test/retest reliability was found to be 0.73, reflecting reasonable stability. Finally, comparing scores of subjects who took both Forms A and B of the test calculated alternate-form reliability. The result of the correlation for responses to Form A and Form B was found to be $r = 0.75$. According to
Portney, a correlation of 0.9 is considered excellent, 0.8 is good, 0.7 is fair, and 0.6 or below is considered poor. Means and standard deviations were equivalent for both forms.

The validity of the WGCTA was examined in many different settings where different teaching methods were used. As stated by Adams et. al, "Content and construct validity of the WGCTA has been assessed in a variety of educational and occupational settings that value and promote the development of critical thinking." A study by Sorenson found students in a laboratory-centered biology class showed greater improvement in Watson-Glaser critical thinking scores than students in classes where a traditional lecture approach was applied.

Scores on the WGCTA have been highly correlated with other various measures of academic achievement, including the Stanford Achievement Tests, Otis-Lennon Mental Ability Tests, American College Test and Scholastic Aptitude Test. The correlation between Form A of the WGCTA and Stanford Achievement Test (language) was found to be $r=0.53$, significant at 0.01 level when students in ninth grade were tested at a public high school in the Northeast. The correlation between Form B of the WGCTA and Stanford Achievement Test (reading) was found to be $r=0.49$, significant at 0.01 level when students in eighth grade were tested at a public high school in the Northeast. The correlation between Form A and Form B of the WGCTA and the Otis-Lennon Mental Ability Test, Adv., Form J was found to be $r=0.70$, significant level at 0.01 when students in the twelfth grade were tested at a public high school in the Northeast. The correlation between Form A and Form B of the WGCTA and the American College Test (composite scores) was found to be $r = 0.65$, significant level at 0.01 when freshman students were
tested in an orientation course at a university in the South. Finally, the correlation between Form A and Form B of the WGCTA and the Scholastic Aptitude Test (verbal) was found to be \( r=0.60 \), significant at 0.01 level when freshman students were tested in a liberal arts course at a branch of a large university in the Northeast. According to Watson-Glaser, a correlation has been found between critical thinking appraisal and intelligence, the five subtests of the WGCTA are "measuring a dimension of ability that can be seen as distinct from overall intellectually ability." According to Miller and Malcolm, the WGCTA measures reasoning ability as a "distinct entity separate from concepts or subjects concerned with a specific discipline, which further validates the tool as a general measurement of critical thinking."

The WGCTA is used in the following 3 ways: 1) to measure gains in critical thinking abilities resulting from instructional programs, 2) to predict success in certain types of occupations in which critical thinking plays an important role, and 3) for research purposes, to determine the relationship between critical thinking skills and other skills, abilities, or traits. Also, according to Watson-Glaser, the WGCTA, "measures the extent to which examinees have mastered certain critical thinking skills and thus provides a partial estimate to which this objective of instruction has been achieved." The availability of Form A and Form B makes it possible to measure development of critical thinking skills in PT students from their first year to their third year.

**Grade Point Average (GPA)**

GPA is defined as the grade points earned divided by the number of credits taken, or the average grade of a student. It can be measured at various stages of a person's
education. In this study, the following two GPA measurements will be used: prerequisite GPA and first semester professional program GPA for first year physical therapy students. The prerequisite GPA is the average of all prerequisite course grades required for entrance into the program. First semester professional program GPA consists of 32 units and 10 courses taken in the first year in physical therapy school.

When analyzing what GPA really means, Tiessen asks, “Could it be students’ ability to read or impress the teacher? Is it a measure of the art of test taking or one’s diligence in expending the effort to study?” She interprets GPA to be at least one reflection of the quality of academic performance, although some educators believe it is a poor standard because of its subjectivity. Levine et al reports, “GPA is most frequently used to evaluate preprofessional academic achievement.” He also states that medical and allied health professions education programs most commonly use cumulative GPA and standardized (aptitude) test scores as admission criteria. GPA is commonly employed as one criterion for screening applicants for admission into Physical Therapy programs. “Previous academic achievement generally is assumed to be a fair and reliable indicator of the ability of students to succeed in any educational program.” Despite its subjectivity, programs still employ it as an admissions criterion. In this study, if critical thinking can be highly correlated with academic success in the PT program (GPA) and clinical success in future studies, then critical thinking scores may be a useful admissions criterion.
WGCTA and GPA

Many studies have assessed the WGCTA results of the general population where critical thinking is known to play a small, but significant part, such as nursing, occupational therapy, physical therapy, and medical programs to examine a possible correlation between critical thinking skills and GPA.\textsuperscript{1,3,5,11,31} The WGCTA is the most widely used test in literature regarding nursing programs. No notable research has been done in physical therapy. For physical therapists, as well as nurses, the analysis of complex data about patients, problem solving, clinical decision-making, and clinical judgment are essential. Therefore, the following material evaluating the association of WGCTA and GPA in nursing programs is appropriate for comparison with physical therapy education programs.

Berger reported no significant relationships between WGCTA scores and GPA in Bachelor of Science nursing (BSN) students.\textsuperscript{7} On the contrary, Bauwens and Gerhard analyzed first semester cumulative GPA, entry GPA, and first semester WGCTA scores of 177 BSN students and found a weak, but significant relationship. Entry GPA was defined as all courses taken at the studied institution required for admission to the nursing program of first year students. Cumulative GPA was based on grades in classes within the nursing program. A Pearson correlation coefficient of $r = 0.35 \, (p < 0.005)$ was calculated between the WGCTA scores measured during the first week of enrollment in the upper division nursing program and entry GPAs. The correlation between the same WGCTA scores and cumulative GPA of nursing students had the Pearson correlation coefficient of $r = 0.32 \, (p < 0.005)$.\textsuperscript{3} The strength of these associations is low, but significant. Bauwens and Gerhard also found that the correlation between Nursing
Certified License Exam (NCLEX) performance, a clinical performance measure, with entry WGCTA scores was $r = 0.42$. The authors believe, “this supports that pre-existing critical thinking ability at entry may predict ultimate success on this cognitive dimension of nursing performance.” The authors found that there was no significant difference between entry and fifth term WGCTA scores, suggesting “specific nursing educational experiences do not produce gains in critical thinking ability.” They suggested this finding might be related to the WGCTA emphasis on logic rather than process. The lack of improvement in scores might suggest that nursing education is not placing an emphasis on logic.

Tiessen examined the correlation between WGCTA scores and the predictor variables of “SAT verbal score, SAT quantitative score, GPA, age, and total number of credit hours in the natural sciences, behavioral/social sciences, arts and humanities, and professional nursing courses” required in a four-year baccalaureate nursing program of 150 students. Low positive correlations were found with grade point average (0.32), total number of credit hours in the arts and humanities (0.30), and SAT quantitative score (0.38). Using a multiple regression analysis, the combination of these variables was given an $r$-value equaling 0.49. She then concluded that a combination of these variables best predicted critical thinking abilities. From this, the researchers noted that the WGCTA scores’ correlation with GPA was not any higher than with the other predictor variables.

Behrens found that when a Pearson correlation was used, WGCTA scores and fall semester GPAs for each of three freshman classes of BSN students yielded coefficients of 0.59, 0.529, and 0.511. “Each of these correlations was significant ($p < 0.01$ or better)”.
The researchers noted the strength of the association of these variables was low, suggesting that GPA is not a good predictor of critical thinking or vice versa. “It is doubtful that a single measure can be found [to] forecast long-term performance.” This study does not suggest the WGCTA be the only predictor used as an admissions criterion.

Adams et al analyzed the relationship between WGCTA scores and American College Test (ACT) composite scores, GPA, and age of BSN students. “GPA was positively correlated with sophomore WGCTA raw scores and each subtest (r = 0.2733 [raw scores]; r = 0.2621 [interpretation]; r = 0.2281 [deduction]; r = 0.1722 [inference]; r = 0.1534 [recognition of assumptions]; r = 0.1079 [evaluation of arguments]).” Senior level WGCTA raw scores yielded a low positive correlation with GPA (r = 0.1537). Gross et al. found that the cumulative GPAs of 45 BSN students were significantly (p < 0.05) correlated to WGCTA scores at both the time of admission (r = 0.32) and completion of the BSN program (r = 0.35). At graduation, the combination of both the baccalaureate and associate nursing students WGCTA scores and cumulative GPA was significantly correlated at 0.20 (p < 0.05). The researchers interpret the strength of all of these associations to be low.

**GPA and Clinical Performance**

Many studies found positive low correlations between clinical performance and GPA. Hayes et al state, “Predictive relationships may be hard to identify because most of the predictor and outcome variables have limited variability among the scores.” This suggests a poor sensitivity of the measuring tool for clinical performance. Rheault and Shaferdich-Coulson examined the records of 65 graduates of a physical therapy program
and found no significant relationship between preprofessional overall academic achievement and professional academic achievement \((r = 0.23)\) or between preprofessional overall academic achievement and clinical performance \((r = 0.04)\). These results show an ambiguous relationship between clinical performance and overall grade point averages, reference letters, and interviews.

The records of 42 graduates of a four-year baccalaureate physical therapy program were analyzed by Balogun who found that "clinical performance was significantly correlated to preprofessional GPA \((r = 0.34, p < 0.05)\)." The strength of this association was low. Tidd and Conine investigated the relationship between academic achievement and the clinical performance of 285 graduate physical therapy students at Indiana University by comparing the students’ grades in behavioral sciences preprofessional courses, biological sciences, physical therapy courses, total academic programs, and the clinical practicums with clinical performance. Clinical performance was based on "composite evaluations by clinical instructors pertaining to students’ ability to evaluate, plan, and implement a patient care program, use effective verbal and nonverbal communication, participate in administration activities of a unit, and support and augment professional activities." They found positive low correlations \((p < 0.001)\) between clinical performance and preprofessional GPA \((r = 0.29)\) and total academic achievement GPA \((r = 0.39)\). They concluded, "academically better students generally tend to perform better in the clinic" and "the preprofessional GPA of a student can be a strong indicator of his success in the professional studies." When looking at the relationship of freshman GPAs with success in gaining admission to professional
physical therapy programs, McGinnis reports that freshman GPA contributed to 45% of the variance in the criterion significantly at the 0.01 level, $r = 0.67$.

**METHODS AND MATERIALS**

**Subjects**

Twenty-nine physical therapy students enrolled in the first year (2001) of the Master of Physical Therapy degree program at California State University, Northridge (CSUN) volunteered for this study. Students were a sample of convenience and included 9 male and 20 female adults, ages ranging from 20 to 35 years old (Table 1). Inclusion was based on eligibility criteria established by the Physical Therapy Program within the CSUN Department of Health Sciences. The criteria include completion of lower and upper division prerequisite courses with a GPA of 3.00 or above and a grade of C or above in each class. If a prerequisite course for the Professional Physical Therapy Program is repeated once, the higher grade is accepted. A maximum of 15 units in prerequisite courses may be repeated. If the course is repeated more than once, the repeated grades are averaged. Academic success (GPA 3.00 or higher) reflected in the last 60 semester (90 quarter) hours of undergraduate coursework is required. Students are also required to provide evidence of admission to CSUN, have completed a minimum of 70 units toward a baccalaureate degree unless in graduate status, and be a legal permanent resident of the State of California. Additional criteria for inclusion in the study were completion of 32 units in the first year of physical therapy school with a minimum of 3.0 GPA and no less than a C in any course.
Table 1. Characteristics of First Year P.T. Student Subjects

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>age (year) mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>29</td>
<td>23.72 ± 3.43</td>
</tr>
<tr>
<td>Women</td>
<td>20</td>
<td>22.70 ± 1.81</td>
</tr>
<tr>
<td>Men</td>
<td>9</td>
<td>26.00 ± 5.00</td>
</tr>
</tbody>
</table>

Instrumentation

The Watson-Glaser Critical Thinking Appraisal (WGCTA) was used to measure the subjects’ ability to problem solve, interpret, and evaluate statements and arguments typical of those experienced in everyday life. Instructions and examples for the different subtests can be found in Appendix C. This test consists of two forms, each containing 80 items. Form A was administered at the onset of the students’ first semester in the program. Form A of the WGCTA was selected based upon its established reliability (r = 0.85) and validity. This form is divided into five subtests, including inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments.

Research Design

The variables were the WGCTA scores, grade point average (GPA) in prerequisite courses, and GPA in first semester professional program courses. The association between these continuous variables was examined.

* Watson-Glaser Critical Thinking Appraisal; Psychological Corporation 555 Academic Court San Antonio, TX 78204 Telephone (800) 211-8378.
Procedure

At the beginning of the fall semester in 2001, Form A of the WGCTA was distributed to the incoming class. All subjects read and signed an Informed Consent Form (Appendix A) approved by the California State University, Northridge Standard Advisory Committee for the Protection of Human Subjects. All subjects were able to read, understand and follow commands given in English. Instructions for the WGCTA, as outlined in the test manual, were explained to the subjects. To insure compliance with confidentiality regulations, each participant was assigned a code which replaced their name for data analysis. The only person privy to information matching the data to individual’s names was Professor Beth Simpson.

Data Analysis

A descriptive analysis was performed for all three variables: prerequisite GPA, professional program first semester GPA and WGCTA scores. The Pearson r was used to assess the degree of association between each of the GPA measures and the WGCTA scores. Alpha was set at 0.05.

Results

The mean score for the 29 subjects on the WGCTA was 51.4 (Table 2). The mean GPA for prerequisite courses was 3.41 while the mean first semester GPA was 3.69 (Table 2). The Pearson r was used to determine the degree of association between the variables. The correlation of the WGCTA scores and prerequisite GPA was very low and non-significant ($r = 0.04$, $p = 0.85$, Table 3). The correlation of the same critical thinking
scores with first semester GPA was higher, but was also not significant ($r = 0.32, p = 0.09$, Table 3). A low, but statistically significant correlation was found between the two GPA measures ($r = 0.42, p = 0.02$, Table 3).

### Table 2. Results of Test of Critical Thinking (WGCTA) and Grade Point Averages for First Year P.T. Students

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>WGCTA Score</td>
<td>51.4</td>
<td>7.80</td>
</tr>
<tr>
<td>Prerequisite GPA</td>
<td>3.41</td>
<td>0.31</td>
</tr>
<tr>
<td>First semester GPA</td>
<td>3.69</td>
<td>0.37</td>
</tr>
</tbody>
</table>

### Table 3. Correlation of Critical Thinking Scores (WGCTA) and Grade Point Averages for First Year P.T. Students

<table>
<thead>
<tr>
<th></th>
<th>R</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>WGCTA with Prerequisite GPA</td>
<td>0.04</td>
<td>0.85</td>
</tr>
<tr>
<td>WGCTA with First Semester GPA</td>
<td>0.32</td>
<td>0.09</td>
</tr>
<tr>
<td>Prerequisite GPA with First Semester GPA</td>
<td>0.42</td>
<td>0.02*</td>
</tr>
</tbody>
</table>

* Statistically Significant, p< 0.05

**Discussion**

Absolute scores on the WGCTA can range from 0-80. The mean score for the physical therapy students in this study was 51.4. Percentile rankings of scores obtained in a study of 182 nursing students can be used as a point of comparison (Table 4). The mean absolute score for the P.T. students corresponds to the 25th percentile for nursing students. This means that 75% of nursing students scored above the mean score for P.T.
students. Based on this, either nursing students have better competency in critical thinking than P.T. students, or perhaps the test is not assessing the type of critical thinking used in physical therapy.

The mean of critical thinking scores was lower than anticipated (mean = 51.4) with a SD of 7.8. Our data is, however in keeping with ranges reported in a comparative study by Wilson. Wilson reported data on health care professional students from eight research articles done by other investigators using the WGCTA where mean scores for PT students were as low as 45 on pretests. However, only one study from the eight produced critical thinking scores lower than our study results, and several reported substantially higher scores on both pretests and posttests. It is possible that our students may have felt unprepared or lacked incentive to perform well on the WGCTA on the first day of class. Reasons may include high excitement or lack of motivation to take a test on first day of P.T. school.

A lack of correlation between GPAs and critical thinking scores can be explained in several ways. Perhaps first semester grades do not reflect critical thinking. This can be especially true when the majority of the curriculum subjects (such as anatomy and physiology) are designed to increase basic science knowledge rather than developing problem solving and critical thinking based on previously learned material. It is a reasonable assumption that GPA may be more reflective of critical thinking abilities later in the physical therapy program when the curriculum requires students to do more clinical decision-making using their critical thinking skills. Research done in the nursing profession supports this explanation with several studies unable to demonstrate a significant correlation between GPA and critical thinking.  

1,3,5,7,11,31
It is also possible that the WGCTA itself may not be the appropriate standardized test to assess the critical thinking skills in P.T. students, while grades may or may not reflect critical thinking abilities. In a study published after the onset of this project, the WGCTA, along with two other critical thinking tests, were administered to P.T. students to examine the reliability, responsiveness, and concurrent validity of the three instruments. The result revealed a moderately high degree of association between WGCTA and California Critical Thinking Skill Test (CCTST). This strongly suggests that these assessment tools measure the same construct. The correlation between WGCTA and California Critical Thinking Dispositions Inventory (CCTDI) was not significant (Table 5). There was no statistically significant change in the pre and post critical thinking scores of the students administered before and after their first two semesters in the graduate physical therapy program. The author of the study concluded that these types of generic critical thinking tests actually are not responsive for measuring critical thinking gains in physical therapy students. The test-retest reliability for the WGCTA was reported as 0.73. This reliability level suggests that WGCTA scores had a relatively high measurement error.\(^3\) This means scores relatively fluctuate greatly due to factors other than a change in skill that the test is supposed to measure.

The single significant finding of our study, though weak, was the correlation between prerequisite GPA and first semester GPA. On average, students' showed a slight increase from their prerequisite GPA to their first semester GPA (Table 2). One possible explanation is the different grading criteria found in a graduate versus undergraduate curriculum. In undergraduate education, a "C" is acceptable, whereas in
graduate education, a "B" is acceptable. Hence, students' may have higher expectations in a graduate program and therefore work harder and perform better.

One limitation to this study included small sample size. Also, in this study, no association between WGCTA scores and gender or age was investigated. This limitation was also evident in the Wilson study utilizing the WGCTA with physical therapy students, and should be considered in future investigations.

Table 4. Norms for Raw Scores Corresponding to Designated Percentiles for Nursing Students*

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Nursing students in baccalaureate programs at universities in the West</th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td>77-80</td>
</tr>
<tr>
<td>97</td>
<td>72-76</td>
</tr>
<tr>
<td>95</td>
<td>70-71</td>
</tr>
<tr>
<td>90</td>
<td>67-69</td>
</tr>
<tr>
<td>85</td>
<td>65-66</td>
</tr>
<tr>
<td>80</td>
<td>64</td>
</tr>
<tr>
<td>75</td>
<td>62-63</td>
</tr>
<tr>
<td>70</td>
<td>61</td>
</tr>
<tr>
<td>65</td>
<td>60</td>
</tr>
<tr>
<td>60</td>
<td>59</td>
</tr>
<tr>
<td>55</td>
<td>58</td>
</tr>
<tr>
<td>50</td>
<td>57</td>
</tr>
<tr>
<td>45</td>
<td>56</td>
</tr>
<tr>
<td>40</td>
<td>55</td>
</tr>
<tr>
<td>35</td>
<td>53-54</td>
</tr>
<tr>
<td>30</td>
<td>52</td>
</tr>
<tr>
<td>25</td>
<td>50-51</td>
</tr>
<tr>
<td>20</td>
<td>48-49</td>
</tr>
<tr>
<td>15</td>
<td>45-47</td>
</tr>
<tr>
<td>10</td>
<td>42-44</td>
</tr>
<tr>
<td>5</td>
<td>39-41</td>
</tr>
<tr>
<td>3</td>
<td>37-38</td>
</tr>
<tr>
<td>1</td>
<td>0-36</td>
</tr>
<tr>
<td>N</td>
<td>182</td>
</tr>
<tr>
<td>Mean</td>
<td>56.4</td>
</tr>
<tr>
<td>SD</td>
<td>9.1</td>
</tr>
</tbody>
</table>

Table 5. Correlation of Critical Thinking Scores of WGCTA, California Critical Thinking Skill Test (CCTST), and California Critical Thinking Dispositions Inventory (CCTDI)

<table>
<thead>
<tr>
<th></th>
<th>Pearson Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>WGCTA with CCTST</td>
<td>0.778*</td>
</tr>
<tr>
<td>WGCTA with CCTDI</td>
<td>0.390</td>
</tr>
<tr>
<td>CCTST with CCTDI</td>
<td>0.137</td>
</tr>
</tbody>
</table>

* Statistically significant, p< 0.05

Conclusion

We conclude that prerequisite GPAs and first semester GPAs were not an effective tool to predict WGCTA scores in physical therapy students at CSUN. The relationship between GPA and critical thinking skills are not fully understood and warrants further research. Further investigation and development of an instrument to measure critical thinking skills applicable to the physical therapy students is merited. We agree with Wilson’s suggestion that critical thinking instruments with higher sensitivity should be developed. Until then, a longer interval between pretest and posttest is advisable to researchers with the current tools to demonstrate changes in level of performance in critical thinking skills.
REFERENCES


THE ASSOCIATION BETWEEN CRITICAL THINKING AND GRADE POINT AVERAGE IN ENTRY-LEVEL MASTERS DEGREE PHYSICAL THERAPY PROGRAM

INFORMED CONSENT FORM

The Association Between Critical Thinking and Grade Point Average in Entry-Level Masters Degree Physical Therapy Program, conducted by Heather Andersen, Sharmi Patel, and Sandor Szilagyi, as part of the requirements for the Masters of Physical Therapy degree, is designed to find any possible association between critical thinking skills and grade point average (GPA) in first year students in the physical therapy program at California State University, Northridge.

The purpose of this study is to determine if critical thinking skills of first year physical therapy students are associated with prerequisite and first semester professional program GPA.

The study will be conducted in a designated Physical Therapy Research Laboratory, in the Engineering building at California State University, Northridge (CSUN). You will be asked to fill out the Watson-Glaser Critical Thinking Skills Appraisal (WGCTA), which takes about forty minutes to fill out. It consists of questions asking you to critically think your way through everyday situations.

Any information that is collected in this study that can be identified specifically with you will remain confidential and will be disclosed only with your permission or if required by law. The cumulative results of this study will be published, but the names or identities of the subjects will not be known. All data/documentation collected as part of this project will be kept on file by the researcher at the conclusion of the study. The results of this research may be published and used for educational purposes for the information of other physicians, clinicians, and scientists. Each participant’s personal information, including name, WGCTA score, and GPA will correspond to a specific code number. This code number will be issued by the chair of the study, Beth Phillips Simpson, MPT, and knowledge of each participant’s identity will be solely known to her. Therefore, the researchers of this study will not be able to match any WGCTA score or GPA with any participant.

The benefits of this study to humanity are: 1) to determine if there is an association between prerequisite GPA and critical thinking skills, 2) to determine if there is an association between first semester professional program GPA and critical thinking skills, and 3) to determine if there is an association between prerequisite and first semester professional program GPA. You will not receive monetary compensation for participation in this study. You will be told of any new information that may affect your willingness to continue in this research. Your refusal to participate in the project will in no way involve penalty or loss of benefits to which you are otherwise entitled.
The only known risks that may be involved with our project are emotional distress and physical stress, which may occur from taking any test. You may leave the study at any time. You will receive no direct benefit from this study. In the event that physical injury arising from participation in this investigation requires care, you will be responsible for this care. First aid will be provided by the staff of CSUN physical therapists. If additional medical attention is required, you will see your customary health resources.

If you have any questions now or later, please ask us. You will be given a copy of this form to keep. If you wish to voice a concern about the research, you may direct your question(s) to Research and Sponsored Projects, 18111 Nordhoff Street, California State University, Northridge, Northridge, CA 91330, or phone 818-677-2901. If you have a specific question(s) about the study, you may contact Beth Phillips Simpson, MPT, professor, 18111 Nordhoff Street, Northridge, CA 91330, or phone 818-677-3107.

Your participation is strictly voluntary. You may decline to participate or withdraw from the research at any time.

I have read the above and understand the conditions outlined for participation in the described study. I am giving my informed consent to participate in this study.

<table>
<thead>
<tr>
<th>Subject’s Last Name</th>
<th>First Name</th>
<th>Middle Name</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Subject’s Signature</th>
<th>Date</th>
<th>Witness Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

If you have signed this form, please return it in an envelope by mail to:
Beth Phillips Simpson, MPT
Department of Physical Therapy
California State University, Northridge
18111 Nordhoff Street
Northridge, CA 91330

Or give this form to Heather Andersen, Sharmi Patel, or Sandor Szilagyi
APPENDIX B

RIGHTS OF HUMAN SUBJECTS IN MEDICAL EXPERIMENTS

Any person who is requested to consent to participate as a subject in a research study involving a medical experiment or who is requested to consent on behalf of another, has the right to:

1. Be informed of the nature and purpose of the experiment.

2. Be given an explanation of the procedures to be followed in the medical experiment, and any drug or device to be utilized.

3. Be given a description of any attendant discomforts and risks reasonably to be expected from the experiment.

4. Be given an explanation of any benefits to the subject reasonably to be expected from the experiment, if applicable.

5. Be given a disclosure of any appropriate alternative procedures, drugs or devices that might be advantageous to the subject, and their relative risks and benefits.

6. Be informed of the avenues of medical treatment, if any, available to the subject after the experiment if complications should arise.

7. Be given an opportunity to ask any questions concerning the experiment or the procedures involved.

8. Be instructed that consent to participate in the medical experiment may be withdrawn at any time and the subject may discontinue participation in the medical experiment without prejudice.

9. Be given a copy of any signed and dated written consent form used in relation to the experiment.

10. Be given the opportunity to decide to consent or not to consent to a medical experiment without the intervention of any element of force, fraud, deceit, duress, coercion, or undue influence on the subject’s decision.

X
Signature of Subject

X
Date

In conformance with provisions of Chapter 1.3, Section 24170 of Div. 20 of State of California Health & Safety Code.
APPENDIX C

INSTRUCTIONS AND EXAMPLES OF THE DIFFERENT SUBTESTS FOR THE
WGCTA

TEST 1: INFERENCE

DIRECTIONS

An inference is a conclusion a person can draw from certain observed or supposed facts. For example, if the lights are on in a house and music can be heard coming from the house, a person might infer that someone is at home. But this inference may or may not be correct. Possibly the people in the house did not turn the lights and the radio off when they left the house.

In this test, each exercise begins with a statement of facts that you are to regard as true. After each statement of facts you will find several possible inferences—that is, conclusions that some persons might draw from the stated facts. Examine each inference separately, and make a decision as to its degree of truth or falsity.

For each inference you will find spaces on the answer sheet labeled T, PT, ID, PF, and F. For each inference make a mark on the answer sheet under the appropriate heading as follows:

EXAMPLE

Two hundred students in their early teens voluntarily attended a recent weekend student conference in a Midwestern city. At this conference, the topics of race relations and means of achieving lasting world peace were discussed, since these were the problems the students selected as being most vital in today's world.

1. As a group, the students who attended this conference showed a keen interest in racial problems and of world peace.
2. The majority of the students had previously discussed the conference topics in their schools.
3. The students came from all sections of the country.
4. The students discussed mainly labor relations problems.
5. Some teenage students felt it worthwhile to discuss problems of race relations and ways of achieving world peace.

TEST 2: RECOGNITION OF ASSUMPTIONS

DIRECTIONS

An assumption is something presupposed or taken for granted. When you say, "I'll graduate in June," you take for granted or assume that you will be alive in June, that your school will judge you to be eligible for graduation in June, and similar things.

Below are a number of statements. Each statement is followed by several proposed assumptions. You are to decide for each assumption whether a person, in making the given statement, is really making that assumption—that is, taking it for granted, justifiably or not.

If you think that the given assumption is taken for granted in the statement, make a heavy black mark under "ASSUMPTION MADE" in the proper place on the answer sheet. If you think the assumption is not necessarily taken for granted in the statement, blacken the space under "ASSUMPTION NOT MADE." Remember to judge each assumption independently.

Below is an example. The block at the right shows how these items should be marked on the answer sheet.

EXAMPLE

Statement: "We need to save time in getting there so we'd better go by plane."

Proposed assumptions:
1. Going by plane will take less time than going by some other means of transportation. (It is assumed in the statement that the greater speed of a plane over the speeds of other means of transportation will enable the group to reach its destination in less time.)
2. There is plane service available to us for at least part of the distance to the destination. (This is necessarily assumed in the statement since, in order to save time by plane, it must be possible to go by plane.)
3. Travel by plane is more convenient than travel by train. (This assumption is not made in the statement—the statement has to do with saving time, and says nothing about convenience or about any other specific mode of travel.)
TEST 3: DEDUCTION

DIRECTIONS

In this test, each exercise consists of several statements (premises) followed by several suggested conclusions. For the purposes of this test, consider the statements in each exercise as true without exception. Read the first conclusion beneath the statements. If you think it necessarily follows from the statements given, make a heavy black mark under "CONCLUSION FOLLOWS" in the proper place on the answer sheet. If you think it is not a necessary conclusion from the statements given, put a heavy black mark under "CONCLUSION DOES NOT FOLLOW," even though you may believe it to be true from your general knowledge.

Likewise, read and judge each of the other conclusions. Try not to let your prejudices influence your judgment—just stick to the given statements (premises) and judge each conclusion as to whether it necessarily follows from them.

The word "some" in any of these statements means an indefinite part or quantity of a class of things. "Some" means at least a portion, and perhaps all of the class. Thus, "Some holidays are rainy" means at least one, possibly more than one, and perhaps even all holidays are rainy.

Study the example carefully before starting the test.

EXAMPLE

Some holidays are rainy. All rainy days are boring. Therefore—

1. No clear days are boring. (The conclusion does not follow. You cannot tell from the statements whether or not clear days are boring. Some may be.)

2. Some holidays are boring. (The conclusion necessarily follows from the statements since, according to them, the rainy holidays must be boring.)

3. Some holidays are not boring. (The conclusion does not follow, even though you may know that some holidays are very pleasant.)

TEST 4: INTERPRETATION

DIRECTIONS

Each exercise below consists of a short paragraph followed by several suggested conclusions.

For the purpose of this test, assume that everything in the short paragraph is true. The problem is to judge whether or not each of the proposed conclusions logically follows beyond a reasonable doubt from the information given in the paragraph.

If you think that the proposed conclusion follows beyond a reasonable doubt (even though it may not follow absolutely and necessarily), then make a heavy black mark under "CONCLUSION FOLLOWS" in the proper place on the answer sheet. If you think that the conclusion does not follow beyond a reasonable doubt from the facts given, then blacken the space under "CONCLUSION DOES NOT FOLLOW." Remember to judge each conclusion independently.

Look at the example below; the block at the right shows how the answers should be marked on the answer sheet.

EXAMPLE

A study of vocabulary growth in children from eight months to six years old shows that the size of spoken vocabulary increases from zero words at age eight months to 2562 words at age six years.

1. None of the children in this study had learned to talk by the age of six months. (The conclusion follows beyond a reasonable doubt since, according to the statement, the size of the spoken vocabulary at eight months was zero words.)

2. Vocabulary growth is slowest during the period when children are learning to walk. (The conclusion does not follow since there is no information given that relates growth of vocabulary to walking.)
TEST 5: EVALUATION OF ARGUMENTS

DIRECTIONS
In making decisions about important questions, it is desirable to be able to distinguish between arguments that are strong and arguments that are weak, as far as the question at issue is concerned. For an argument to be strong, it must be both important and directly related to the question.

An argument is weak if it is not directly related to the question (even though it may be of great general importance), or if it is of minor importance, or if it is related only to trivial aspects of the question.

Below is a series of questions. Each question is followed by several arguments. For the purpose of this test, you are to regard each argument as true. The problem then is to decide whether it is a strong or a weak argument.

Make a heavy black mark on the answer sheet under "ARGUMENT STRONG" if you think the argument is strong, or under "ARGUMENT WEAK" if you think the argument is weak. Judge each argument separately on its own merit. Try not to let your personal attitude toward the question influence your evaluation of the argument, since each argument is to be regarded as true.

In the example, note that the argument is evaluated as to how well it supports the side of the question indicated.

EXAMPLE
Should all young men in the United States go to college?

1. Yes; college provides an opportunity for them to learn school songs and cheers. (This would be a silly reason for spending years in college.)

2. No; a large percent of young men do not have enough ability or interest to derive any benefit from college training. (If this is true, as the directions require us to assume, it is a weighty argument against all young men going to college.)

3. No; excessive studying permanently warps an individual's personality. (This argument, although of great general importance when accepted as true, is not directly related to the question, because attendance at college does not necessarily require excessive studying.)