EFFECTS OF A TECHNOLOGY ENRICHED LEARNING ENVIRONMENT ON STUDENT DEVELOPMENT OF HIGHER ORDER THINKING SKILLS

DISSERTATION

Presented to the Graduate Council of the
University of North Texas in Partial
Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

Michael H. Hopson, B.S., M.A.

Denton, Texas

May, 1998

Hopson, Michael H., Effects of a Technology Enriched Learning Environment on Student Development of Higher Order Thinking Skills, Doctor of Philosophy (Curriculum and Instruction), August, 1998, 135 pp., 10 tables, bibliography, 58 titles.

The problem for this study was to enhance the development of higher order thinking skills and improve attitudes toward computers for fifth and sixth grade students. The purpose of this study was to determine the impact of a Technology Enriched Classroom on student development of higher order thinking skills and student attitudes toward the computer.

A sample of 80 sixth grade and 86 fifth grade students was tested using the Ross Test of Higher Cognitive Processes. The Ross Test was selected because of its stated purpose to judge the effectiveness of curricula or instructional methodology designed to teach the higher-order thinking skills of analysis, synthesis and evaluation as defined by Bloom. The test consisted of 105 items grouped into seven subsections. In addition, the students were surveyed using the Computer Attitude Questionnaire developed by the Texas Center for Educational Technology. The questionnaire assessed sixty-five questions combined to measure eight attitudes.

The study demonstrated that a Technology Enhanced Learning Environment significantly and positively impacted the development of the higher order thinking skill of evaluation for fifth grade students. The study also determined that exposure to technology positively impacts student attitudes for Computer Importance, Motivation, and Creativity. Although the treatment and comparison groups for grade six were determined not to be comparable, the results of the treatment was such that further study is recommended.

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ACKNOWLEDGEMENTS

The writer expresses his sincere appreciation to those fifth and sixth grade students and teachers who so graciously participated in this study.

A special acknowledgement and expression of gratitude is extended to Dr. Richard Simms, who inherited a doctoral student and accepted the challenge. His encouragement and patience were extraordinary.

The writer is grateful for the assistance and advice provided by his advisory committee: Dr. Gerald Knezek, Dr. Robert Bane, and Dr. C. A. Hardy.

The writer also acknowledges the special contribution made by Dr. Patricia Moseley.

To his wife, Judy, the author is deeply indebted for the consistent encouragement and unwavering support during this long process.

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INTRODUCTION

Background

The need to prepare students for the Information Age is a recurring theme throughout the Educational Reform Movement. Various national reports have criticized the educational system for failing to prepare students for the world in which they will spend their adult lives. Fontana (1993) states that the advent of the Information Age has made crucial the development of higher-order thinking skills by learners who will be required to synthesize large volumes of information into meaningful knowledge structures without becoming lost in a quagmire of data and information. To be productive citizens in a rapidly changing technological society students will, according to Morgan (1996), need to have strong critical thinking and problem-solving skills. Hence, experiences that engage students at higher levels of Bloom's Taxonomy (Analysis, Synthesis, and Evaluation) will need to become common practice.

Norris and Poirot (1990) note that educators no longer believe that a knowledge of the basics is sufficient in our ever changing world and thus the teaching of problem solving, critical-thinking, and higher order thinking skills is at the top of many educational agendas. According to Harris (1996), "Information Age citizens must learn not only how to access information, but more importantly how to manage, analyze, critique, cross-reference, and transform it into usable knowledge." (p.15)

An early response to the need for introduction of technology into the educational environment was the creation of Individualized Learning Systems or ILS Labs in schools. Kelman (1989) identifies a number of instructional areas that could be improved by computer-assisted learning but which are not supported by available ILS programs: higher order thinking skills, creative expression, personal and professional productivity, cooperative learning, multiple-modality learning, and individual empowerment. Becker and Hativa (1994) note the movement of some ILSs beyond the simple drill and practice through the addition of materials that require students to delve into complex problems in ways that promote deep reflection and genuine understanding. The new ILS design follows more of a constructivist view of learning by providing a rich learning environment. Word processing programs, spreadsheets, mathematical graphing programs, encyclopedias, and thesauruses are only a few examples of the software and other resources that allow students to construct meaning and enhance critical thinking (Van Dusen and Worthen, 1995).

In his discussion of the shortcomings of the "computer lab," Salomon (1990) concludes that for the computer to be an effective classroom tool,

> the introduction of computer-related activity must be accompanied by a host of other changes. In fact most everything in the classroom needs to change in a way that makes curriculum, learning activities, teacher's behavior, social interactions, learning goals, and evaluation interwoven into a whole newly orchestrated learning environment. (p. 51)

On their list of Top 10 Reasons for Using Technology, Peck and Dorricot (1994) include: graduates must be proficient at accessing, evaluating, and communicating information; and graduates must solve complex problems. Further, they note that technologies can be designed to encourage students to engage in problem solving and critical thinking.

Muir (1994) notes that in light of what we know about learning, using the computer as a tool for meaningful projects seems a reasonable solution. Since students learn by constructing their own knowledge through using new information in meaningful ways, the classroom of tomorrow should be designed using very little "educational software" in favor of tool software. Ragsdale (1989) challenged educators to teach with the computer because "tool" applications are independent of subject matter and can be used for curriculum integration across grade levels and subject areas. In his review of earlier studies, Atkins (1993) noted that the richer and more comprehensive the interactions between learner and material, the more is learned.

Shavelson, Winkler, Stasz, Feibel, Robyn, and Shaha (1984) examined strategies of teachers who had been judged successful in providing computer-based instruction with several computers in the classroom. They found that teachers employed one of four strategies for organizing computer use: enrichment, adjunct instruction, drill and practice, or orchestration. Orchestration, which represented the widest variety of instructional applications and linked those applications to the regular curriculum, was the only strategy that provided "the appropriate integration of microcomputer-based learning activities with teachers' instructional goals and with the ongoing curriculum."

Scott, Cole, and Engel (1992) point to the Apple Classroom of Tomorrow Project as one effort intended to refocus the instructional process toward the development of higher order thinking skills and problem solving. What is needed according to Goodson & Mangan (1991) is

> research which not only avoids easy generalizations, but which questions in each instance whether worthwhile pedagogical purposes are being served. Research, which examines computing in context, will ask whose interests are served by a given

> application, how it might impact the social organization of schooling, and what consequences might be anticipated for the process of knowledge production in general. (p. 4)

Harold Levine (1990) points out that with increased placement of microcomputers in the classroom has come an increased interest in assessing their potentially diverse effects. Further, Levine notes that, "the answers to the assessment questions that arise are always difficult to provide, and investigators typically find themselves searching for new study designs and data collection strategies." (p. 461)

Recent studies, as reported by Wiburg (1995-1996) suggest the research in the field has moved beyond a focus on the computer to an interest in developing learning environments and the complex interactions that make up these environments. It is Taube's (1995) conclusion then that the primary factor to be considered in designing an environment which fosters critical thinking is the creation of a classroom which develops within the students the disposition for critical thinking.

Dede (1990) suggests that higher-order thinking skills for structured inquiry are best acquired where: 1) learners construct knowledge rather than passively ingest information; 2) sophisticated information-gathering tools are used to stimulate the learner to focus on testing hypotheses rather than on plotting data; 3) there is collaborative interaction with peers, similar to team-based approaches underlying today's science; 4) evaluation systems measure complex, higher-order skills rather than simple recall of facts.

David (1992) notes that the potential for significant curriculum and instruction reform in the classroom is becoming more a reality through the use of the computer. This restructuring of the classroom includes the use of computers to provide active learning, authentic tasks, challenging work, complex problem solving, and higher order thinking skills (Dalton & Goodrum, 1991; David, 1992).

In her discussion of the possibility of the computer changing the schools, Harris (1996) observed:

> Some historians like Eugene Provenzo (1986) believe that it will. The widespread use of the computer as a means by which to organize and control knowledge--to maximize human intelligence -- is as important a revolution in the history of thought and thinking as the invention of writing or the Gutenberg revolution with its invention of movable type. (p. 13)

If this belief is assumed to be correct, then the new classroom environment must be designed around the computer in the same way that the traditional classroom is textbook driven.

According to Ryan (1991) this current perceived need for improving instruction and student achievement through the use of computer technologies has challenged educational administrators to find optimal ways of integrating computers into learning environments. Kulik (1985) and Niemiec (1984) note that research in the area has become voluminous and is rapidly increasing. A review of this research has not clearly delineated the relationship between implementation characteristics and increased academic achievement (Chen, 1985; Hoot, 1986; Stennett, 1985).

Ryan (1991) also notes that a variety of implementation characteristics must be considered in order to maximize the benefits of any instructional program. Successful educational administrators and planners must consider scheduling (e.g. period and duration), physical setting, target populations, content area, hardware, and software, as well as training and characteristics of teachers. Interactive computer learning is not unique in this regard. Very few studies have examined carefully the impact of such external structures or have developed meaningful analyses of them (Kulik, 1984). Ryan further concludes that administrators would benefit from research that identifies factors of computer implementation that contribute to increased academic achievement.

In discussing what's wrong with recent research, Kinnaman (1990) notes that previous studies have suggested the need for more research which demonstrates the effectiveness of relatively small-scale, high-quality projects, carried out under well-controlled conditions and treated like experiments guided by theoretical ideas about teaching and learning. In their comparative study of the use of the computer for improving higher order thinking skills, Cousins and Ross (1993) conclude that "there is little research which would inform practice as to the use of the computer as a tool to accomplish prespecified tasks"(p. 94). An additional conclusion is that studies designed to measure change in student performance are needed, specifically in higher order thinking skills.

Statement of the Problem

The problem for this study was to enhance the development of higher order thinking skills and improve attitudes toward computers for fifth and sixth grade students.

Purpose of the Study

The purpose of this study was to determine the impact of a Technology Enriched Classroom on student development of higher order thinking skills and student attitudes toward the computer.

Research Questions

This study addressed the following research questions:

1. Do students in a Technology Enriched Classroom demonstrate better use of higher order thinking skills than students in a traditional classroom?

2. Do attitudes toward computers differ between students in a Technology Enriched Classroom and students in a traditional classroom?

Hypotheses

1. The raw score for Analysis on the Ross Test of Higher Cognitive Processes for students in the treatment group will be significantly higher than the raw score for students in the comparison group.

2. The raw score for Synthesis on the Ross Test of Higher Cognitive Processes for students in the treatment group will be significantly higher than the raw score for students in the comparison group.

3. The raw score for Evaluation on the Ross Test of Higher Cognitive Processes for students in the treatment group will be significantly higher than the raw score for students in the comparison group.

4. The raw score for each subsection of the Computer Attitude Questionnaire will be significantly higher for students in the treatment group indicating a more positive attitude than for students in the comparison group.

Significance of the Study

This study will add to the limited research on the use of computers to enhance the student development of higher order thinking skills. It will ultimately provide data that may be used to create a new paradigm for classroom organization and structure. The results will also be useful for educators who are formulating long-range technology plans.

Limitations of the Study

This study is limited by the characteristics of the population. The suburban district's profile is not comparable to that of the state or nation, and therefore, generalizations will require additional research. A second concern is the inability to control for the impact of personal and home computers on the comparison group. In addition, the higher order thinking skills studied are limited to analysis, synthesis, and evaluation as identified by Bloom and measured by the instrument.

Definition of Terms

The following terms are defined relative to this study:

Higher order thinking skills -- those cognitive skills that allow students to function at the Analysis, Synthesis, and Evaluation levels of Bloom's Taxonomy.

Analysis -- the ability to break down a whole object or idea into its component parts.

Synthesis -- the ability to combine component parts or ideas to create a whole or solution. Synthesis is considered to require a higher level of cognitive ability than analysis.

Evaluation -- the highest level described by Bloom, evaluation is the ability to make quantitative and qualitative judgements.

Technology enriched classroom--a classroom in which the computer and associated technology are used as tools to facilitate learning. In this classroom, the focus is on the use of technology to access, manipulate, evaluate, and report information.

CHAPTER 2

REVIEW OF LITERATURE

An analysis of the literature regarding the use of technology as the focus for an "Information Age" instructional environment results in the identification of three broad topics. The first topic is easily identified as "Factors Encouraging Change." A second category in which a significant amount of research exists is "Cognitive Theory." Finally, there is considerable information regarding "Classroom Design."

Factors Encouraging Change

In discussing the introduction of computers into American schools, Martinez and Mead (1988) note that perhaps the most important problem to be addressed is the continuing disagreement among educators about whether to teach computing per se or to integrate computing into the curriculum. Scott, Cole, & Engel (1992) observe that using computers as a medium of communication, rather than trying to program the machines to teach students or getting the students to program the machines, is a recent concept. Educational technology is in the early stages of a revolution that is barely perceived and full of potential (Schwen, Goodrum, Knuth, & Dorsey, 1993)

Ramirez (1994) notes that in response to the changing role of education in society, schools, districts, and states are developing higher standards or expectations for what they want their students to know and be able to do. Further, Ramirez observes that educators must recognize that all students require an education that enables them to master higher-order thinking skills because those skills are the ones that they will need in the workplace.

Papert (1994,p.2 cited in Crawford, 1996) notes that "In the wake of the startling growth in science and technology in our recent past, some areas of human activity have undergone a megachange....School is a notable example of an area that has not." In a study of technology based mathematics classroom, Crawford, (1996) concludes that there are significant tensions between traditional forms of educational practice with traditional educational technologies and the new forms of cultural activity associated with the creative possibilities of new and complex technological systems. The greater marketplace reinforces these tensions, especially since the market for new technologies is driven primarily by a tradition based on the retrieval and storage of data rather than on reconfigured or constructive technologies that combine information and produce new knowledge systems (Privateer, 1997).

The significant and necessary transition into the next stage of the information age will tend to remain a potential unless the emphasis on the "conduit" evolves into one of "content" and "outcome." But what would make the use of technology truly valuable would be how it would encourage learners to develop and test the creation of new knowledge systems (Privateer, 1997).

In addition Privateer concludes that a major consequence of ignoring the pedagogical aspect of educational technology is that of failing to prepare students to become "knowledge workers."

> The United States Department of Labor, as well as many leading corporations, has created an anatomy for new kinds of employee skills. They are:
>
> - the capacity for applying sustained inferential, synthetic and inventive knowledge in the creation of new ways of working that enhances the ability to produce results
> - a willingness to be lifelong, generative learners whose minds are comfortable with, rather that resistant to, force of change
> - a genuine inquisitiveness connected to others and to life in general
> - the ability to intellectually and critically be part of larger creative processes, able to influence but not singularly control it, and perhaps most importantly

- the skills and ability to function as symbol manipulators able to code, decode and recode symbols in work environments heavily driven by the use, invention and application of information (Privateer, 1997, p. 85)

Privateer further points out that educators must focus on the use of technology to incorporate and stimulate new pedagogical theories rather than strictly on the delivery of course materials. Failure to do so will result in a continuation of an educational system that is rapidly failing to meet the needs of post-industrial learners.

Cognitive Theory

In order for schools to address the economic and societal demands on education, it is apparent that a new paradigm is needed. In a Wyoming study designed to test the potential of applying the technologies of computer-aided instruction and expert systems to implementation of cognitive and metacognitive strategy instruction programs, Hofmeister (1990) observed that:

> ...the individualized instruction approach was found to be inadequate for several reasons. First, the technology was not sensitive to, and could not anticipate, the kinds of responses that must be made in the application of study and metacognitive strategies. Secondly, the technology did not provide useful models

for the application of strategies. As the field-test teacher observed, it failed to provide the process experience of learning to think through content. In view of the feedback received from the field test teacher and information gained from a further review of the literature, the instructional modules of the prototype program were revised to facilitate learner-directed and group-based instruction (p. 2).

In information age schools, according to McKenzie (1993), students create their own meaning. They explore piles of fragments--sorting, sifting, weighing and arranging them until a picture emerges. Elliot Eisner (1993) has described this as representation that is the process of "transforming the contents of consciousness into a public form so that they can be stabilized, inspected, edited, and shared with others." (p. 5)

Schwen et al. (1993) conclude that:

Collaborative Learning must be supported by our technology. Learning is far more of a social process than we have conceded in the past (Resnick, 1987); and pedagogy should emphasize: (a) active participation by all learners (teachers and students), (b) a community of and for learning, (c) jointly constructed knowledge by the community, and (d) a more democratic relationship between those labeled students and teachers (Brush, 1993; Hansen & Perry, 1993). (p. 5)

Current research in the fields of cognition and brain theory points toward a learning environment that as identified by Ramirez (1994) emphasizes:

- Interaction rather than isolation: Knowledge and expertise develop when students have a chance to interact with resources that include their peers, teachers, experts from various fields, and print and electronic text and databases.
- Cognitive research: Students learn best when the tasks involve meaningful contexts, activities, and problems so that they can actively construct their own knowledge and develop the ability to apply what they learn to new situations. (p. 26)

Technology is viewed as a way to help implement this new paradigm in which the learner actively manipulates information in class in a variety of contexts from a number of different resources in order to solve meaningful and relevant problems (Ramirez 1994).

Using technologies effectively in education requires shifting of focus from teaching to learning, with more and more of the learning coming under the control of the learner. Researchers advocate active--not passive--learning, learning tasks and apprenticeships that rely on authentic relevant problem solving, sustained and challenging work in individualized settings, collaborative groupings, and emphasis on higher-order thinking skills and complex problem solving, project-based and thematic syntheses of subject matter, greater student involvement, and students' control over their own learning (Ramirez, 1994).

Facione, Facione, and Sanchez (1994) observed that, "Educating good critical thinkers is more than developing critical thinking skills. A complete approach to developing good critical thinkers includes nurturing the disposition toward critical thinking , an effort...integral to insuring the use of critical thinking skills outside the narrow instructional setting."(p. 28)

In order to enhance learning, technology must be harnessed to support the processes students use when they learn. From the cognitive view, knowledge exists in the brain in meaningful "chunks." Students need repeated exposures to variations of a concept before they can incorporate it into their cognitive schemata (Morgan, 1996). Crawford (1996) observed that "recent research suggests that the experiences of creating and changing learning contexts, with or without the use of new technologies, is a powerful learning activity." (p. 58)

Koschmann (1996) identified a growing interest in collaborative methods of instruction that dispenses with traditional, teacher-centered activities in favor of group-based problem solving (e.g., project-based, problem-based and small-group learning) (Blumenfled, 1991; Koschmann, 1996; Webb, 1982). He further observed that workers in the area of computer support for collaborative learning are exploring ways that technology can augment and extend collaborative forms of instruction. Collaboration requires that students master the use of representation for which according to Koschmann, there are a number of cognitive benefits. In addition, he states that the process of representing a complex concept facilitates comprehension, retention, and its flexible application in practice. In seeking to represent what they know, learners make their beliefs public and their misconceptions visible. By presenting their perspectives to others, they enrich and are enriched through exposure to multiple viewpoints of an issue.

Classroom Design

Regardless of the factors fueling educational change and the increased knowledge about cognition, real progress can only be accomplished if the classroom design changes correspondingly.

Shavelson et al. (1984) identified a new classroom paradigm that he called orchestration. He discovered that orchestrating teachers used several types of software that they integrated into the curriculum, coordinated the activities with other instructional means, and stressed both cognitive and basic goals. In addition, Shavelson noted that the orchestrating style seems to arise naturally when higher order, intelligent programs, either as focused lessons or as mixed games and lessons, are the mediums of instruction. Orchestrated classrooms, according to

Shavelson, depend for their success on a considerable degree of student autonomy and responsibility. They provide a context in which students naturally develop responsibility for their own learning.

In 1989, Tinker and Papert made a number of recommendations about how computers might be used in education: for communication, for interfacing, for theory building, for creativity, for database access, and for programming. The Laboratory of Comparative Human Cognition (1989) in recommending that the educational use of computers be extended to include telecommunications noted that "Modern computer technology, when used as a component in a telecommunications system, offers a link between children, teachers, and the outside world in educationally powerful ways." (p.80)

Studies of the use of telecommunications as a integral part of overall educational activity consistently find that, when properly organized, telecommunications provides rich opportunities for children to articulate new goals. It enables them to reflect on their own learning, to use writing as a tool for both communication and thought, and to create social contexts that are not merely "passive backgrounds" for learning but are arenas for goal oriented reflective problem solving (LCHC, 1989; Levin, Rogers, Waugh, & Smith, 1989).

In 1989 Schwartz, the developer of the Geometric Supposer software stated that:

> because the software environment reduces the difficulties associated with the exploration of the domain and indeed provides rich tools for such exploration, those who have access to such an environment can with the appropriate stimulation, use that access to explore the domain.... appropriate stimulation because... for most of us, problem posing and problem solution are in large measure social activities. We need the stimulation of our peers, our students, and our teachers. (p.58)

Complementing his previous formulation of the computer as tool, tutor, or tutee, Taylor (1991) indicates that in each of these roles, three different specific functions of the computer need to be considered: state resurrection, time compression, and graphical representation. State resurrection means the ability of the computer to resurrect a particular set of prior conditions in the current computing situation. He points out the security that this ability provides to the user and the greater propensity to take risks, and therefore, to take an experimental approach to learning. Time compression is the ability to compress into a short time activities that in everyday life would take much longer. Again the benefit is added incentive for an experimental approach to learning. The benefit of graphic representation is the ability of the learner to rehearse his or her attempt as visualization.

Although originally convinced that explorations of tools like hypermedia and advanced work stations would provide a new and powerful learning environment, Schwen et al. (1993) began to see that the concepts of learning and work, information, and collaboration technology were what was important to the creation of an Enriched Learning and Information Environment. He further defined:

> enriched learning and information environments from a socio-technical perspective as: *people* using *technology* to perform specific *work practices* in a particular physical and cultural *environment*. The technology that supports people within such environments can be seen as a performance system of conceptual and technical tools that enhance:
>
> (1) information management;
>
> (2) collaboration management;
>
> (3) productivity through embedded guidance and work metaphors;
>
> (4) a problem-solving environment that integrates basic tools, information management, collaboration and productivity tools in a seamless environment. (p. 8)

A study funded by the United States Department of Education demonstrated that technology resulted in "less lecturing and more doing of science and math, improved feedback to students, more problem-solving, more hypothesis generating and testing, more performance-based assessment, and increased student creativity (O'Connor and Brie, 1994). According to Peck and Dorricot (1994):

> databases, spreadsheets, computer-assisted design, graphics programs, and multimedia authoring programs allow students to independently organize and analyze, interpret, develop, and evaluate their own work. These tools engage students in focused problem solving, allowing them to think through what they want to accomplish, quickly test and retest solution strategies, and immediately display the results. (p. 13)

Computers have served their purpose when students using multimedia tools find learning more interesting and engaging as a result of creating an interactive project (perhaps one that makes information pop up on the screen when you click a button). When students are more enthusiastic about research (because they know how their fully interactive final report is going to look), then computers have made a valuable contribution to the educational process (Muir, 1994).

Designing a classroom employing computerized learning resources can facilitate research and exploration. Such a design includes extensive tool and database software such as: word processors, databases, reference programs, and spelling and grammar checkers. Students use these tools to explore new content, solve problems, and create new concepts and associations (Van Dusen and Worthen, 1995).

Educators cannot lose sight of the fact that it is instructional strategies not media that cause improvements in achievement. The faces, fragrances, and emotions, of life's contexts will never be effective candidates for computer simulations. Simulated outcomes of decisions impractical to experience live, literature review, and data collection are technology applications consistent with sound instructional strategies. (Lookatch, 1995)

Morgan (1996) explains that after the concepts that students are to learn are defined and the links to what students already know are identified, it's time to consider how technology can be used to enhance the learning environment. Morgan further identifies the following four checkpoints:

1) How does technology provide students with multiple exposures to variations of concepts?

2) How does technology increase student productivity?

3) How does technology actively involve students in the learning process?

4) How does technology engage students at higher levels of Bloom's Taxonomy? (p. 51)

Creativity and exploration demand a setting in which the explorer/creator/learner is able to own the project, grapple with it, and take responsibility for the outcomes of the activity. In schools, such a context implies radical rearrangement of the power relationships between teachers, administrators and students and of traditional forms of social organization (Crawford, 1996).

"Educational Technology" which now encompasses networks, telecommunications, and video serves as a catalyst in the transformation of the relationships and organization of the classroom (Koschmann, 1996). Koschmann further observed that an even more profound change has occurred with respect to the instructional models underlying classroom practice. Telecommunications and multimedia workstations bring vast resources of information into the classroom for students to employ in the learning process. The technologies provide students with the opportunity to work actively with the new concepts they are learning and support the assimilation of new information (Morgan, 1996).

Education really can no longer operate as a delivery service. It has to become an active production site, dynamic spaces in which the conveyance of data itself does not determine the intellectual rights and needs of its consumers. Perhaps we need a new perception of the machine, one that replaces the fascination with alacrity with that of intelligence, ingenuity and creativity (Privateer, 1997). What will make the next stage of the information age different from its predecessor however is, according to Privateer, that knowledge for the most part will exist as something applied, as something to be performed and tested, while machines will store needed data in new ways. The individual learner will neither be understood nor rewarded as someone who has information, but as someone who activates designs and performs knowledge.

Summary

The introduction of the computer and related technology into the classroom has occurred at an accelerated pace. Many would argue that the implementation of technology has focused more often on the machine itself rather than on the improvement of the learning environment. A review of the literature reveals that there are obvious tensions between those who see the computer as a replacement for the instructor and those who view the computer as an instructional tool.

Much of the early research focused on computer assisted instruction and its impact on learning. This study attempted to evaluate the effects of a Technology Enriched Classroom on student acquisition of higher order thinking skills.

CHAPTER 3

DESIGN AND METHODOLOGY OF THE STUDY

Population

The population for this study was fifth and sixth grade students in a suburban North Central Texas school district. The treatment group was comprised of students who were enrolled in the Technology Enriched Classroom magnet program in 1996-97, as well as those enrolled for the 1997-98 school year. The students who were accepted into the magnet program comprised the treatment group and were selected by random drawing from among the students making application. The group included students from each of the district's six elementary campuses.

Research Design

This study was a post-test only design. The treatment and comparison groups were administered the Ross Test of Higher Cognitive Processes and the Computer Attitude Questionnaire developed by the Texas Center for Educational Technology.

Instrumentation

The Ross Test was selected because of its stated purpose to judge the effectiveness of curricula or instructional methodology designed to teach the higher-order thinking skills of analysis, synthesis and evaluation as defined by Bloom. The reliability coefficients for the test were obtained using test-retest and split-half procedures. The test-retest reliability coefficient was .94, which is significant beyond the .001 level. The coefficient derived from the split-half procedure is reported as .92 ($p < .001$). The test validity was determined by correlation with chronological age and was found to be r=.674.

The Computer Attitude Questionnaire (CAQ) was used to determine student attitudes toward the computer. The questionnaire used sixty-five Likert-type questions for six psychological dispositions. The reliability for the six attitude measures ranges from 0.80 to 0.86.

The reliability coefficients in Table 1 were calculated using data from 1995 (N=588). The values reflect the internal consistency of the instrument and are all within the "very good" range. Table 1 contains the reliability for the Computer Attitude Questionnaire as reported by. Knezek, 1996.

Table 1

Internal Consistency Reliability for the Computer Attitude Questionnaire

Attitude	# of items	reliability
Computer Importance	7	0.82
Computer Enjoyment	9	0.82
Motivation	9	0.80
Study Habits	10	0.87
Empathy	10	0.87
Creativity	13	0.86
Computer Anxiety	8	0.84
Computer Seclusion	13	0.81

Research Design

Four distinct groups were identified for the study. Sixth grade students who had been in the program for one (1) year and five (5) months comprised treatment group one, while fifth grade students who had been in the program for five (5) months constituted treatment group two. Students in both the sixth and fifth grade magnet programs were selected by random drawing from among students making application. Treatment group one, sixth graders, were required to have passed all sections of the fourth grade Texas Assessment of Academic Skills Test. Not such prerequisite existed for the fifth grade treatment group. Treatment group one included twenty (20) male and sixteen (16) female students. Treatment group two was composed of twenty- (20) male and twenty-three (23) female students.

Sixth grade students enrolled in social studies classes at the same middle school as the treatment group were selected for comparison group one. Students in comparison group one were selected from pre-existing middle school classes to which they had been randomly assigned by a computer-scheduling program. Twenty-one (21) male and twenty-two (22) female students comprised comparison group one.

Students for comparison group two were identified at an elementary school with comparable demographics whose attendance zone was geographically contiguous. Comparison group two students were selected at random from among fifth grade students at the neighboring campus. There were twenty-three (23) male and twenty-one (21) female students in comparison group two. Since neither treatment group included special education students, these students were removed from the comparison groups as well.

The treatment group was instructed using the District's fifth grade curriculum in a technology rich environment and was provided access to the computer as a tool for learning. The treatment group classrooms were equipped with one (1) computer for each two students. The treatment group teachers were trained in the use of and equipped with a multimedia teaching station that was used for most direct instruction.

Students were taught to efficiently use a spreadsheet, database, and word processor. Students were required to use these tools to take notes, produce assignments, and construct projects. In addition, the classroom was equipped with Internet access and "electronic resource materials" such as: thesaurus, encyclopedia, and atlas. Additionally, students were taught to use a scanner, Quick-Take Camera, and the multimedia presentation software Hyperstudio. The students were required to include multiple resources on all presentations and projects. The teachers reported that the technology enriched classroom differed from the traditional classroom in several significant ways. The learning was more student centered and less teacher/textbook driven. The environment facilitated the use of cooperative groups and student participation focused on application rather than knowledge acquisition. The almost exponential increase in available sources of information in the technology enriched classroom created the need for student learning to be assessed using non-traditional methods. The use of individual student products and group projects replaced tests and homework as the primary assessment tools.

The comparison groups were instructed in a traditional classroom setting using the District's prescribed curriculum for fifth grade. The teachers for the comparison groups were not trained in the use of technology and no teaching stations were available to them. The comparison group classrooms had no computers. The only exposure to technology for students in the comparison groups was through the campus computer labs that were used for computer literacy and remediation, using software designed by the Jostens Company.

Data Analysis

Standard statistical procedures were used to analyze the data for comparison of the comparison group and the treatment group. Univariate Analysis of Variance was used to establish equivalence for the comparison and treatment groups. For the Ross Test, a One-Way Analysis of Variance was used to analyze the data for Grade Five and an Analysis of Covariance was used for the Grade Six data. The Computer Attitude Questionnaire data for both grades were analyzed using an Analysis of Variance.

CHAPTER 4

PRESENTATION OF RESULTS

Summary of Statistical Procedures

Computer statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS). Since pre-existing classes were used for the samples, an Analysis of Variance was done in order to establish equivalence of the treatment and comparison groups. The most recent scores on the Texas Assessment of Academic Skills were compared across the groups. A total raw score for each case was calculated by summing the Texas Learning Index scores for the math and reading subtests. Statistics for the TAAS scores are presented in Table 2.

Table 2

TAAS Scores

Group	Mean	Std. Deviation
Grade Six		
Comparison Group*	176.09	13.77
Treatment Group**	184.06	7.25
Grade Five		
Comparison Group***	177.50	9.06
Treatment Group***	177.57	7.35

Note: *n=43; **n=36; ***n=42

An Analysis of Variance was performed on the data using the group (treatment vs. comparison) as the independent variable and the Texas Assessment of Academic Skills total score as the dependent variable. The results are presented in Table 3 below.

Table 3

Comparison of TAAS scores for Group One and Group Two

Variable	Sum of Squares	df	F-value	Significance of F
Grade Six TAAS				
Between	1242.957	1	9.764	0.003**
Within	9797.517	77		
Grade Five TAAS				
Between	.107	1	0.002	0.968
Within	5576.786	82		

**The F-score for the between groups comparison is significant ($p<0.01$)

The results of the ANOVA to assess group equivalence on TAAS scores indicated that there was no significant difference between the groups for Grade Five and thus the assumption of group comparability was appropriate. Since the difference between the Grade Six TAAS scores for treatment versus comparison groups was significant, an Analysis of Covariance using TAAS score as a covariate was deemed more appropriate for Grade Six. Results indicated that the sixth grade treatment and comparison groups were not comparable.

Statistical Responses to the Research Questions

Research Question 1. Do students in a Technology Enriched Classroom demonstrate better use of higher order thinking skills than do students in a traditional classroom?

Hypothesis 1. The raw score for Analysis on the Ross Test of Higher Cognitive Processes for students in the treatment group will be significantly higher than the raw score for students in the comparison.

Hypothesis 2. The raw score for Synthesis on the Ross Test of Higher Cognitive Processes for students in the treatment group will be significantly higher than the raw score for students in the comparison.

Hypothesis 3. The raw score for Evaluation on the Ross Test of Higher Cognitive Processes for students in the treatment group will be significantly higher than the raw score for students in the comparison group.

Statistics for all groups on the Ross Test are reported in Table 4. Maximum scores for each subtest are: Analysis – 36; Synthesis – 39; and Evaluation – 30. The results for Grade Six demonstrate a higher raw score for the Treatment Group on each subtest. However, the Grade Five results show that the Comparison Group outscored the Treatment Group on the Synthesis subtest. The Analysis and Evaluation subtest scores were higher for the Treatment Group.

Table 4

Raw Scores for the Ross Test of Higher Cognitive Ability

Group	Subtest	Mean	Std. Deviation
Grade Six			
Comparison			
	Analysis	22.53	15.07
	Synthesis	23.00	6.43
	Evaluation	18.93	4.06
Treatment			
	Analysis	23.89	4.28
	Synthesis	25.92	5.70
	Evaluation	22.19	3.82
Grade Five			
Comparison			
	Analysis	19.05	5.23
	Synthesis	23.05	5.17
	Evaluation	15.21	4.72
Treatment			
	Analysis	19.36	4.22
	Synthesis	21.47	4.67
	Evaluation	20.36	3.49

Since the ANOVA indicated a significant difference between the treatment and comparison groups on the TAAS scores for Grade Six, an Analysis of Covariance was used to analyze the data. The results for Grade Six, shown in Table 5, indicate that the difference between the scores for the Treatment Group and the Comparison Group on the Evaluation subtest was significant at the 99% confidence level. There was no significant difference in the performance of the two groups on the Analysis and Synthesis subtests.

Table 5

Comparison of Ross Test Results for Grade Six Treatment and Comparison Groups

Variable	Sum of Squares	df	F-value	Significance of F
Analysis	3.047	1	0.024	0.878
Synthesis	28.697	1	0.885	0.350
Evaluation	122.110	1	8.111	0.006**

**Significant at p<0.01.

The data collected from the Ross Test for Grade Five, presented in Table 6 below, was analyzed using a One-Way ANOVA.

Table 6

Comparison of Ross Test Results for Grade Five Treatment and Comparison Groups

Variable	Sum of Squares	df	F-value	Significance of F
Analysis				
Between	2.060	1	0.092	0.762
Within	1904.216	85		
Synthesis				
Between	54.298	1	2.248	0.137
Within	2053.105	85		
Evaluation				
Between	574.227	1	33.629	0.000**
Within	1451.383	85		

(**Significant at p<0.01.)

The results for Grade Five indicate that the difference between the scores for the Treatment Group and the Comparison Group on the Evaluation subtest were significant at the 99% confidence level. There was no significant difference in the performance of the two groups on the Analysis and Synthesis subtests.

Research Question 2. Do attitudes toward computers differ between students in a Technology Enriched Classroom and students in a traditional classroom?

Hypothesis 4. The raw score for each subsection of the Computer Attitude Questionnaire will be significantly higher for students in the treatment group than for students in the comparison group.

An analysis of the data indicates that no significant difference exists between the scores of the comparison and treatment groups on the Computer Attitude Questionnaire for Grade Six. While no subtest proved significant, scores for Importance, Enjoyment, Motivation, and Study Habits were higher for the treatment group. The comparison group scores were higher for Empathy, Creativity, Anxiety (indicating less), and Seclusion (indicating less). The results are presented in Table 7 below.

Table 7

Computer Attitude Questionnaire Raw Scores for Grade Six Treatment and Comparison Groups

Variable	Mean	Standard Deviation
Computer Importance		
Treatment	2.8750	.3513
Comparison	2.7562	.4032
Computer Enjoyment		
Treatment	2.7708	.2257
Comparison	2.7069	.2200
Motivation		
Treatment	2.2118	.2417
Comparison	2.1743	.2778
Study Habits		
Treatment	2.4844	.2371
Comparison	2.4534	.2556
Empathy		
Treatment	2.8531	.3910
Comparison	2.8828	.5086
Creativity		
Treatment	3.1707	.4166
Comparison	3.2042	.3618
Computer Anxiety		
Treatment	1.9453	.3283
Comparison	2.0905	.4373
Computer Seclusion		
Treatment	2.4447	.2367
Comparison	2.4814	.2636

Table 8, which follows, presents the results of the ANOVA (One-tailed) for the Computer Attitude Questionnaire for Grade Six. As noted in the analysis of the Ross Test Data, the significant variance between the groups for Grade Six makes the results suspect.

Table 8

Comparison of Computer Attitude Questionnaire Results for Grade Six Treatment and Comparison Groups

Variable	Sum of Squares	df	F-value	Significance of F*
Computer Importance				
Between	0.291	1	1.958	0.083
Within	13.092	88		
Computer Enjoyment				
Between	8.430E-02	1	1.711	0.097
Within	4.337	88		
Motivation				
Between	2.896E-02	1	0.410	0.262
Within	6.209	88		
Study Habits				
Between	1.972E-02	1	0.318	0.288
Within	5.466	88		
Empathy				
Between	1.811E-02	1	0.082	0.388
Within	19.482	88		
Creativity				
Between	2.324E-02	1	0.159	0.346
Within	12.844	88		
Computer Anxiety				
Between	0.435	1	2.687	0.053
Within	14.242	88		
Computer Seclusion				
Between	2.781E-02	1	0.430	0.257
Within	5.696	88		

(* One-tailed test)

Student scores for grade five, as presented in Table 9, were higher for the treatment group on subtests measuring Importance, Enjoyment, Motivation, Study Habits, Empathy, Creativity, and Seclusion (indicating less seclusion). The comparison group scored higher on the Anxiety subtest (indicating less anxiety). ($p<0.050$).

Table 9

Computer Attitude Questionnaire Raw Scores for Grade Five Treatment and Comparison Groups

Variable	Mean	Standard Deviation
Computer Importance		
Treatment	2.7352	.4245
Comparison	2.5679	.4754
Computer Enjoyment		
Treatment	2.6721	.2249
Comparison	2.6531	.2572
Motivation		
Treatment	2.3333	.3033
Comparison	2.2222	.3012
Study Habits		
Treatment	2.6488	.2873
Comparison	2.5878	.2629
Empathy		
Treatment	2.9366	.3878
Comparison	2.8537	.4032
Creativity		
Treatment	3.3002	.3680
Comparison	3.0882	.5187
Computer Anxiety		
Treatment	1.9453	.3500
Comparison	2.0122	.3706
Computer Seclusion		
Treatment	2.5253	.2383
Comparison	2.4916	.2407

The difference in scores was significant only for the subtests measuring Importance, Motivation, and Creativity. The results are presented in Table 10.

Table 10

Comparison of the Results of the Computer Attitude Questionnaire for Grade Five Treatment and Comparison Groups

Variable	Sum of Squares	df	F-value	Significance of F
Computer Importance				
Between	0.573	1	2.824	0.049*
Within	16.247	80		
Computer Enjoyment				
Between	7.377E-03	1	0.126	0.362
Within	4.670	80		
Motivation				
Between	0.253	1	2.770	0.050*
Within	7.309	80		
Study Habits				
Between	7.622E-02	1	1.005	0.160
Within	6.066	80		
Empathy				
Between	0.141	1	0.901	0.173
Within	12.517	80		
Creativity				
Between	0.921	1	4.555	0.018*
Within	16.182	80		
Computer Anxiety				
Between	6.879E-02	1	0.530	0.235
Within	10.393	80		
Computer Seclusion				
Between	2.338E-02	1	0.408	0.263
Within	4.589	80		

* Significant at $p<0.05$ (One-tailed test.)

CHAPTER 5

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This post-test only study was conducted using fifth and sixth grade students in a suburban North Central Texas school district. The treatment and comparison groups were administered the Ross Test of Higher Cognitive Processes and the Texas Center Educational Technology Computer Attitude Questionnaire. The Ross Test was selected to measure the higher-order thinking skills of analysis, synthesis and evaluation as defined by Bloom. The Texas Center for Educational Technology Questionnaire was used to assess student attitudes in eight individual areas.

Two distinct groups were identified for the study. Group one was composed of sixth grade students while fifth grade students comprised group two. Thirty-six students who had been in the Technology Magnet Program for one year and five months comprised treatment group one.

Forty-three fifth grade students who had been in the Technology Magnet Program for five months constituted treatment group two. Forty-three students comprised comparison group one, and were selected from among students who were not enrolled in the Magnet Program. There were forty-four students in comparison group two, who were selected from a comparable elementary campus.

The statistical analysis was performed using the Analysis of Variance and the Analysis of Covariance procedures. The results of the analysis were evaluated at the 99 percent Confidence Interval in order to answer the following research questions:

Research Question 1. Do students in a Technology Enriched Classroom demonstrate better use of higher order thinking skills than do students in a traditional classroom?

Research Question 2. Do attitudes toward computers differ between students in a Technology Enriched Classroom and students in a traditional classroom?

Findings

Research Question 1 asked if there were significant differences in the development of higher order thinking skills in students taught in a Technology Enriched Learning Environment. No significant differences were found relative to the higher order thinking skill of Analysis and Hypothesis 1 was rejected for grade six. Similarly, Hypothesis 2 was rejected since no significant difference was demonstrated to exist for Synthesis at grade six. The analysis of the results of the test for significance relative to the skill of Evaluation indicated a significance (p<0.01). Hypothesis 3 was accepted for grade six. Research Question 1 must be answered in the negative since only one of the three hypotheses was accepted.

For grade five students, neither Analysis nor Synthesis was found to be significantly different between the treatment and comparison groups. Both Hypothesis 1 and Hypothesis 2 were therefore rejected for grade five. The analysis of the results for the skill of Evaluation indicated that the difference between the groups was significant at a 99 percent confidence interval. Therefore Hypothesis 3 was accepted. The answer to Research Question 1 is also negative for grade five.

In response to Research Question 2, analysis of the data from the Computer Attitude Questionnaire demonstrated that there were no significant differences between the treatment and comparison groups for grade six. Therefore, Hypothesis 4 was rejected for grade six.

The analysis of the data from the Computer Attitude Questionnaire demonstrated that there were significant differences in grade five student attitudes for the Computer Importance (0.049), Motivation (0.050), and Creativity (0.018) subtests. All differences were significant at a 95 percent confidence level. Although no other attitude differences were significant, sixth grade treatment and comparison groups were found to have a difference for the measure of Anxiety (0.105) that might require more study. Hypothesis 4 was rejected based upon the results of the analysis for grade five.

Discussion of Findings

The results of the Analysis of Variance performed on the Texas Assessment of Academic Skills Test scores for the sixth grade indicated that the treatment and comparison groups were not comparable. While the Analysis of Covariance procedure can be used to identify the source of partial variance, the gap between the means of the treatment (184.06) and comparison (176.09) groups makes any results suspect. Therefore, the results for grade six are reported, but no conclusions are drawn. It is noted, however, that even though the groups are not comparable, the sixth grade results for the Ross Test were similar to those for grade five.

Since the ANOVA performed on the TAAS scores for grade five verified the comparability of the groups, the findings are interpreted for both the Ross Test and the Computer Attitude Questionnaire. The significance identified for the Evaluation subtest was consistent with earlier studies. In addition, the results of the Computer Attitude Questionnaire paralleled research done previously with the same instrument.

Conclusions

The creation of a technology enriched classroom environment had a minimal but positive impact on student acquisition of higher order thinking skills. While the difference in scores was not significant for every level of Bloom's Taxonomy, the scores were generally higher for Analysis and Synthesis and were significantly higher for Evaluation. The argument can be made that the minimal impact was less related to an ineffective treatment and more a result of the short duration of the treatment and the inability of the study to comparison for home use of the computer. These weaknesses are addressed in the next section.

The study identified a significant difference between the fifth grade treatment and comparison groups for the skill of evaluation. The significance level strongly supports the conclusion that a technology enriched learning environment enhances development of the higher order thinking skill of evaluation. Evaluation as measured by the Ross Test is defined as the skill of making judgements in terms of both internal and external evidence. Evaluating internal data requires the ability to indicate logical fallacies in arguments. External data evaluation is the skill of making judgements relative to selected criteria.

The implications of this study on the design of classrooms to enhance the development of higher order thinking skills are important. The study has identified technology as the catalyst for restructuring and redesigning the classroom to create an environment that promotes and encourages the development of the higher order skill of Evaluation.

Technology was the tool that allowed the students to move beyond knowledge acquisition to knowledge application. At the same time, the introduction of technological resources transformed the role of the teacher from lecturer to guide. The availability of vast amounts of easily accessible information freed the teacher from the role of purveyor of facts, and allowed the teacher to encourage the students to use the computer as a tool for problem solving and decision making.

The technology enriched classroom environment had a significant and positive effect on the attitudes of Computer Importance, Motivation, and Creativity for fifth grade students. Computer Importance is defined as the perceived value or significance of knowing how to use computers. Unceasing effort and perseverance are attitudes measured by Motivation. Creativity is identified as the attitude exhibited by students who explore the unknown, take individual initiative, and find unique solutions.

An obvious conclusion is that exposure to technology and training in its use result in a more positive attitude relative to Computer Importance. Such a positive attitude indicates that once students are successful using technology and recognize the associated benefits, they will choose to continue using it as a learning tool. More positive attitudes toward Motivation and Creativity indicate that when provided with technology, students are more likely to take comparison of their learning, stay focused until the task is complete, and pursue more obscure and hypothetical solutions to problems.

Recommendations for Further Research

The following suggestions are offered for additional research:

1.) The relationships for the skills of Analysis and Synthesis were positive but not significant. Given the hierarchical nature of Bloom's Taxonomy, the unexplained variance between the groups should be re-examined.

2.) The population from which the samples were selected limited this study. Therefore, the study should be repeated using a more diverse population.

3.) The introduction of technology has been demonstrated to alter the instructional strategies and practices used in the classroom. Additional research is warranted to determine the relationship between the new paradigms and the development of higher order thinking skills.

APPENDIX A

ROSS TEST OF HIGHER COGNITIVE PROCESSES

ROSS TEST OF HIGHER COGNITIVE PROCESSES

TEST BOOKLET

John D. Ross, MA and Catherine M. Ross, MEd

 ISBN: 0-87879-152-3. Printed in the United States of America.

	Section	Score	Percentile
Name ______________________	I		
Last First Middle	II		
School ______________ Grade _____	III		
	IV		
Home Room Teacher ______________	V		
	VI		
Test Date ______________________	VII		
Year Month Day	VIII		
EXP CON	TOTAL		

FIRST TESTING SESSION

Section I, Analogies

Time limit: 10 minutes

Read each sentence. Think about the relationship between the two words and find a word which relates in the same way to the underlined word.

Example: "Wheat" is to "grow" just as house is to

A. place . . . . (A) ☐
B. build . . . . (B) ☒
C. grain. . . . . (C) ☐
D. cottage. . . . . (D) ☐
E. find . . . . (E) ☐

You would choose option (B), build, for in order to have wheat you must grow it, and in order to have a house you must build it. Now, try the next example:

Example: "Wing" is to "bird" just as foot is to

A. inch. . . . . (A) ☐
B. shoe. . . . . (B) ☐
C. hand. . . . . (C) ☐
D. walk. . . . . (D) ☐
E. man . . . . (E) ☒

You would choose option (E), man, since wings enable a bird to move and feet enable a man to move.

When you are told to do so, read the sentences on the following page and choose the correct word.

1. "Scale" is to "weight" just as <u>clock</u> is to

A. hour. . . . . (A) ☐
B. time . . . . (B) ☐
C. year . . . . (C) ☐
D. calendar. . . . . (D) ☐
E. watch. . . . . (E) ☐

2. "Sweater" is to "clothing" just as <u>dollar</u> is to

A. money . . . . (A) ☐
B. dime. . . . . (B) ☐
C. bank. . . . . (C) ☐
D. spend. . . . . (D) ☐
E. wallet. . . . . (E) ☐

3. "Swim" is to "water" as <u>fly</u> is to

A. insect. . . . . (A) ☐
B. air . . . . (B) ☐
C. bird . . . . (C) ☐
D. flew . . . . (D) ☐
E. soar . . . . (E) ☐

4. "Egg" is to "chicken" just as <u>seed</u> is to

A. grow . . . . (A) ☐
B. garden . . . . (B) ☐
C. soil. (C) ☐
D. flower . . . . (D) ☐
E. package . . . . (E) ☐

5. "Shoe" is to "foot" just as <u>ring</u> is to

A. telephone. . . . . (A) ☐
B. bell. (B) ☐
C. finger . . . . (C) ☐
D. circle . . . . (D) ☐
E. bracelet . . . . (E) ☐

6. "Month" is to "year" just as <u>hour</u> is to

A. minute. . . . . (A) ☐
B. second . . . . (B) ☐
C. day. (C) ☐
D. time. . . . . (D) ☐
E. clock . . . . (E) ☐

(Go on to the next page.)

7. "Goose" is to "flock" just as banana is to

A. bunch .... (A) ☐
B. fruit .... (B) ☐
C. peel .... (C) ☐
D. eat .... (D) ☐
E. monkey .... (E) ☐

8. "Automobile" is to "trunk" just as stove is to

A. cook .... (A) ☐
B. refrigerator .... (B) ☐
C. hot .... (C) ☐
D. food .... (D) ☐
E. oven .... (E) ☐

9. "Burn" is to "fire" just as cut is to

A. scissors .... (A) ☐
B. bleed .... (B) ☐
C. tree .... (C) ☐
D. paper .... (D) ☐
E. injure .... (E) ☐

10. "Leg" is to "table" just as spring is to

A. summer .... (A) ☐
B. leap .... (B) ☐
C. water .... (C) ☐
D. bed .... (D) ☐
E. sprung .... (E) ☐

11. "Cage" is to "tiger" just as fence is to

A. squirrel .... (A) ☐
B. farm .... (B) ☐
C. field .... (C) ☐
D. cow .... (D) ☐
E. gate .... (E) ☐

12. "Sharp" is to "cut" just as rough is to

A. smooth .... (A) ☐
B. scratch .... (B) ☐
C. sandpaper .... (C) ☐
D. shiny .... (D) ☐
E. knife .... (E) ☐

(Go on to the next page.)

13. "Freeway" is to "sidewalk" just as <u>tablecloth</u> is to

A. table . . . . (A) ☐
B. carpet. . . . . (B) ☐
C. linen. . . . . (C) ☐
D. dinner . . . . (D) ☐
E. napkin . . . . (E) ☐

14. "Mow" is to "lawn" just as <u>park</u> is to

A. grass. . . . . (A) ☐
B. playground. . . . . (B) ☐
C. visit . . . . (C) ☐
D. area . . . . (D) ☐
E. car . . . . (E) ☐

(This is the end of Section I.) STOP! Please close your test booklet.
Do not open it again until your teacher tells you to do so.

Section I
Score: ________

Section II, Deductive Reasoning

Time limit: 20 minutes

In this part of the test, you will be asked to read some statements and then decide what conclusions could logically follow from what the statements say.

Read the following statements:

All quarks are purple.
All purple things melt in the sun.

If you assume these statements to be true, which of the following conclusions would logically follow from them?

Therefore,

Quarks melt in the sun.
All purple things are quarks.
All things which melt in the sun are purple.

The first conclusion, "Quarks melt in the sun," does follow from the statements above. The other two do not follow, since other things besides quarks can be purple (such as grapes), and other things will melt in the sun (such as snow). You would mark your answer sheet this way:

Quarks melt in the sun.

A. conclusion follows . . . . (A) ☒
B. conclusion does not follow. . . . . (B) ☐

All purple things are quarks.

A. conclusion follows . . . . (A) ☐
B. conclusion does not follow. . . . . (B) ☒

All things which melt in the sun are quarks.

A. conclusion follows . . . . (A) ☐
B. conclusion does not follow. . . . . (B) ☒

You will be given some statements like the ones above. Do not be concerned about the truth of the statements--just assume that the statements are true. You must decide whether the conclusions beneath them do or do not follow from the information given in the statements. More than one conclusion may follow, or none of the conclusions may follow.

When you are told to do so, turn to the following page.
Read the statements carefully. Then read each conclusion.
Mark your answer sheet (A) if the conclusion follows.
Mark your answer sheet (B) if the conclusion does not follow.

If spiders can fly, then spiders have wings.
Spiders do not have wings but they all have feathers.
Therefore,

15. Either spiders fly or they have wings.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

16. If spiders have feathers, then they fly.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

17. Some spiders have no feathers.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

All palimons are known to be fish eaters.
Palimons are also migratory creatures.
Therefore,

18. All fish eaters are palimons.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

19. All fish eaters are migratory.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

20. All migratory creatures are palimons.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

All of Joyce's pets have four legs, but none of them have tails.
No gremlies have four legs and no gremlies have tails.
Therefore,

21. Some gremlies have tails, but none have four legs.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

22. If a gremlie has a tail, it will have four legs.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

23. None of Joyce's pets are gremlies.
    A conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

Ten Arabs left the town of Sahib and went into the desert with eight camels.
One week later, five of these Arabs arrived at the first oasis.
Each one was riding on a camel.
The camels were very thirsty and immediately began drinking water from the oasis.

(Go on to the next page.)

Therefore,

24. The three camels who did not arrive at the oasis returned to Sahib.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

25. Arabs can travel from Sahib to the first oasis in less than nine days.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

26. The three camels who did not arrive at the oasis are not being ridden by Arabs.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

If a person is a Caledonian, he is a pragmatist.
Persons who are Simians are also pragmatists.
Therefore,

27. Simians are pragmatists.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

28. Caledonians are Simians.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

29. If you are a pragmatist you are a Simian.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

All Frenchmen eat meat.
Frenchmen from Normandy eat only beef and Frenchmen from Brittany eat only mutton.
Some Frenchmen are blond.
Therefore,

30. Some mutton eaters are from Brittany.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

31. All Frenchmen eat beef.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

32. Blond Frenchmen from Normandy eat only beef.
    A. conclusion follows. . . . . (A) ☐
    B. conclusion does not follow . . . . (B) ☐

(This is the end of Section II.) STOP! Please close your test booklet.
Do not open it again until your teacher tells you to do so.

Section II
Score: __________

33. First fact—No one can be an "A" student without being intelligent.
Second fact—*(missing fact)*
Conclusion—Therefore, some football players are intelligent.
The missing fact is:

A. No football players are "A" students. . . . . (A) ☐
B. Some football players are "A" students. . . . . (B) ☐
C. If a person is an "A" student, he will play football . . . . (C) ☐
D. Every intelligent student should get "A's." . . . . (D) ☐
E. Some "A" students are not intelligent . . . . (E) ☐

34. First fact—Beauty is in the eye of the beholder.
Second fact—*(missing fact)*
Conclusion—Therefore, all babies are beautiful.
The missing fact is:

A. All mothers think their babies are beautiful. . . . . (A) ☐
B. If you think you are beautiful, you are . . . . (B) ☐
C. Beautiful babies have big eyes . . . . (C) ☐
D. Some babies are prettier than others . . . . (D) ☐
E. Only beautiful mothers have beautiful babies . . . . (E) ☐

35. First fact—Narrow Bay is badly polluted by the industrial wastes from several pulp and paper mills located at its edge.
Second fact—*(missing fact)*
Conclusion—Therefore, there are no fish in Narrow Bay.
The missing fact is:

A. If you go fishing in Narrow Bay, you won't catch anything. . . . . (A) ☐
B. Pulp and paper mills cause pollution . . . . (B) ☐
C. If water is badly polluted, no fish can live in it . . . . (C) ☐
D. Some fish do not live in bays. . . . . (D) ☐
E. All pollution is caused by industrial wastes . . . . (E) ☐

36. First fact—Joe is an underwriter for Niltiac Insurance Company.
Second fact—*(missing fact)*
Conclusion—Therefore, Joe wears a suit to work every day.
The missing fact is:

A. Joe owns five new suits . . . . (A) ☐
B. Only underwriters may wear suits to work. . . . . (B) ☐
C. If you work for Niltiac, you must always wear a suit to work . . . . (C) ☐
D. All people who wear suits work for Niltiac Insurance Company . . . . . (D) ☐
E. If you always wear a suit, you are in the insurance business. . . . . (E) ☐

(Go on to the next page.)

37. First fact—All the cases of measles reported to the clinic last year were in children aged seven and eight.

Second fact—(*missing fact*)

Conclusion—Therefore, some children aged seven and eight had not gotten their measles shots.

The missing fact is:

A. No child who had gotten a measles shot got the measles . . . . (A) ☐
B. All children receiving measles shots were less than nine years old . . . . (B) ☐
C. Some seven and eight-year-old children are very susceptible to measles (C) ☐
D. If a child was eight years old, he had already had his measles shot. . . . (D) ☐
E. Some cases of measles were reported in nine year olds. . . . . (E) ☐

38. First fact—All great opera stars always sing with great emotion.

Second fact—(*missing fact*)

Conclusion—Therefore, all great opera stars are good actors.

The missing fact is:

A. Some good actors have powerful voices. . . . . (A) ☐
B. Only singers can be opera stars. . . . . (B) ☐
C. No one can always sing with deep emotion without being a good actor. . (C) ☐
D. If you can act a part on a stage, you can sing a part in an opera . . . . . (D) ☐
E. All great opera singers are highly emotional people . . . . (E) ☐

39. First fact—Some people who favor day-care centers are opposed to working mothers.

Second fact—(*missing fact*)

Conclusion—Therefore, some people with children are opposed to working mothers.

The missing fact is:

A. All people with children are opposed to day-care centers . . . . (A) ☐
B. All working mothers need day-care centers . . . . (B) ☐
C. A person can't favor day-care centers and be a working mother. . . . . . (C) ☐
D. Some people with children are working mothers . . . . (D) ☐
E. All people with children favor day-care centers . . . . (E) ☐

40. First fact—Large cars use a lot of gasoline and are expensive to operate.

Second fact—(*missing fact*)

Conclusion—Fewer people are buying large cars.

The missing fact is:

A. More people are buying small cars . . . . (A) ☐
B. People tend not to buy things that are expensive to operate . . . . (B) ☐
C. Gasoline is expensive and in short supply. . . . . (C) ☐
D. Some large cars are not expensive . . . . (D) ☐
E. The popularity of cars is related to gasoline prices. . . . . (E) ☐

(This is the end of Section III.) STOP! Please close your test booklet. Do not open it again until your teacher tells you to do so.

Section III
Score: ______

Section IV, Abstract Relations

Time limit: 15 minutes

Read the four words given. Then select a word from Word Pool I which goes with all four words in some way.

Example:

Word Pool I	
A. pin	G. line
B. shoe	H. cross
C. green	I. sign
D. red	J. true
E. cut	K. market
F. saw	L. horse

clothes up straight drive ______

The word which goes with these four words is "line" (clothes-line, line-up, straight line, a line drive). Its letter in the word pool is (G). Put a "G" on the blank like this:

clothes up straight drive __G__

You will not use any word in the pool more than once. You will not use all the words in the pool. Use Word Pool I for questions 41 through 47. Use Word Pool II for questions 48 through 54. Put the letter on the blank after the question number.

When you are told to do so, turn the page, and begin working.

Word Pool I	
A. pin	G. line
B. shoe	H. cross
C. green	I. sign
D. red	J. true
E. cut	K. market
F. saw	L. horse

41.	stock	super	place	meat	_______
42.	hair	class	short	throat	_______
43.	walk	reference	red	word	_______
44.	onion	winter	golf	thumb	_______
45.	work	race	radish	power	_______
46.	stop	name	neon	language	_______
47.	horse	lace	horn	tennis	_______

Remember, you will not use any word in the pool more than once. You will not use all the words in the pool. Use Word Pool II for questions 48 through 54. Put the letter on the blank after the question number.

Word Pool II	
A. hot	G. house
B. cold	H. blue
C. cat	I. letter
D. school	J. side
E. hop	K. diamond
F. fire	L. light

48.	saddle	stroke	track	show	_______
49.	bell	bunny	scotch	car	_______
50.	house	street	moon	switch	_______
51.	pepper	dog	red	rod	_______
52.	keeper	warming	guest	out	_______
53.	head	ice	shoulder	catch	_______
54.	high	board	book	grade	_______

(This is the end of Section IV.) STOP! Please close your test booklet. Do not open it again until your teacher tells you to do so.

Section IV
Score: ___________

Section V, Sequential Synthesis

Time limit: 8 minutes

In this section, you are given a group of statements dealing with a specific topic, "The Championship Season." The statements under this topic are not listed in the proper sequence. You are to read all the statements, determine in what sequence they should occur, and then number the statements in the proper sequence.

When you are told to do so, turn the page, and write the correct sequence number on the blank next to each statement. For example, you should put the number "1" on the blank next to the statement which comes first in the sequence. You would put the number "2" on the blank next to the statement which comes second, and so on. There are ten statements to arrange.

THE CHAMPIONSHIP SEASON

55. With the graduation of these players, we now have the height advantage. ________

56. Next spring, you should see a big gold cup sitting in that space! ________

57. This means that the players should work well together as a team because they've had a lot of practice playing together under the same coach. ________

58. So, with all these things in our favor, is it any wonder that we're saving a space on our trophy shelf? ________

59. The most important factor, however, is our experience. ________

60. First of all, Pacific School, the only school to beat us last year, no longer has any of its star players. ________

61. There are a lot of reasons why I think our school basketball team will win the championship this year. ________

62. They have all graduated. ________

63. We will have the same varsity as last year and the same coach. ________

64. On the average, our players are two inches taller than those on other teams in the league. ________

(This is the end of Section V.) STOP! Please close your test booklet. Do not open it again until your teacher tells you to do so.

Section V
Score: ________

SECOND TESTING SESSION

Section VI, Questioning Strategies

Time limit: 18 minutes

Here are five items:

a safety pin
a key
a pencil
a clothespin
a doorknob

One of these items is "IT." You can learn which one is "IT" by reading the following groups of questions and the answers given for each question.

Question Group I	
1. Does it have a sharp point?	no
2. Is it made of metal?	yes
3. Does it open things?	yes

Question Group II	
1. Is it made of wood?	no
2. Is it made of metal?	yes
3. Does it hold things together?	no

Question Group III	
1. Is it made of wood?	no
2. Does it open things?	yes
3. Does it fit into a lock?	yes

Which item is "IT"?

A. the doorknob. . . . . (A) ☐
B. the safety pin. . . . . (B) ☐
C. the key. . . . . (C) ☒
D. the pencil. . . . . (D) ☐
E. the clothespin . . . . (E) ☐

The correct answer to the question, "Which item is "IT," is (C), the key. The information which you learned from the questions and answers tells you that only "the key" is the correct item.

Which group of questions is the best group for leading you to the answer? Select one group which, by itself, would give you the necessary information to know which item is "IT."

A. Group I . . . . (A) ☐
B. Group II. . . . . (B) ☐
C. Group III . . . . (C) ☒

The group of questions that is the best for leading you to the answer is Question Group III. Group III, by itself, asks questions which lead you directly to the answer, so (C), Group III, is the correct answer. Question Group I, by itself, will not lead you directly to the answer. Question Group II, by itself, will not lead you directly to the answer. Only the questions in Group III give you the necessary information to know which item is "IT."

On the following pages, you will be given sets of five items and three question groups. When you are told to do so, turn the page, find the item which is "IT," and also choose which question group was best for leading you to the correct item.

Here are five items:

shoe
sock   glove
scarf   belt

One of these items is "IT." You can learn which one is "IT" by reading the following groups of questions and the answers given for each question:

Question Group I	
Is it worn outdoors?	yes
Is it worn to keep warmer?	yes
Is it worn around the waist?	no

Question Group II	
Is it always worn on your hand?	no
Is it often worn around your neck?	no
Can it be worn inside a shoe?	no

Question Group III	
Can you turn it inside out?	no
Is it often made out of leather?	yes
Is it always worn on your foot?	yes

65. Which item is "IT"?

A. shoe.................................... (A) ☐
B. sock.................................... (B) ☐
C. belt.................................... (C) ☐
D. glove................................... (D) ☐
E. scarf................................... (E) ☐

66. Which questioning strategy is best in leading you to the answer? Select one group which, by itself, would give you the necessary information to know which item is "IT."

A. Group I................................. (A) ☐
B. Group II................................ (B) ☐
C. Group III............................... (C) ☐

(Go on to the next page.)

Here are five items:

salt
granulated sugar　　powdered sugar
flour　　cocoa

One of these items is "IT." You can learn which one is "IT" by reading the following groups of questions and the answers given for each question.

Question Group I	
1. Is it white?	yes
2. Is it grainy?	no
3. Is it sweet in flavor?	yes

Question Group II	
1. Is it often used with pepper?	no
2. Is it a powder?	yes
3. Is it bitter in flavor?	no

Question Group III	
1. Is it salty in flavor?	no
2. Is it used in cooking?	yes
3. Is it brown?	no

67. Which item is "IT"?

A. salt. . . . . (A) ☐
B. granulated sugar. . . . . (B) ☐
C. powdered sugar . . . . (C) ☐
D. flour . . . . (D) ☐
E. cocoa. . . . . (E) ☐

68. Which questioning strategy is best in leading you to the answer? Select one group which, by itself, would give you the necessary information to know which item is "IT."

A. Group I . . . . (A) ☐
B. Group II. . . . . (B) ☐
C. Group III . . . . (C) ☐

(Go on to the next page.)

Here are five items:

violin
harp guitar
piano ukulele

One of these items is "IT." You can learn which one is "IT" by reading the following groups of questions and the answers given for each question.

Question Group I	
1. Does it have strings?	yes
2. Is it played with the hands?	yes
3. Could one person easily carry it around?	no

Question Group II	
1. Does it have exactly four strings?	no
2. Does it have more than 15 strings?	yes
3. Does it have a keyboard?	no

Question Group III	
1. Is it played with a bow?	no
2. Is it often played with Hawaiian music?	no
3. Could you take it with you in a phone booth?	no

69. Which item is "IT"?

    A. violin . . . . (A) ☐
    B. harp . . . . (B) ☐
    C. guitar . . . . (C) ☐
    D. piano . . . . (D) ☐
    E. ukulele . . . . (E) ☐

70. Which questioning strategy is best in leading you to the answer? Select one group which, by itself, would give you the necessary information to know which item is "IT."

    A. Group I . . . . (A) ☐
    B. Group II . . . . (B) ☐
    C. Group III . . . . (C) ☐

(Go on to the next page.)

Here are five items:

bus
airplane train
bicycle helicopter

One of these items is "IT." You can learn which one is "IT" by reading the following groups of questions and the answers given for each question.

Question Group I	
1. Can it fly in the air?	no
2. Does it have more than two wheels?	yes
3. Does it travel on a track?	no

Question Group II	
1. Does it have more than one wheel?	yes
2. Could it be found at an airport?	yes
3. Could it carry more than one passenger?	yes

Question Group III	
1. Does it have many seats?	yes
2. Does it travel on land?	yes
3. Does it have windows?	yes

71. Which item is "IT"?

A. bus. . . . . (A) ☐
B. airplane . . . . (B) ☐
C. train. . . . . (C) ☐
D. bicycle. . . . . (D) ☐
E. helicopter. . . . . (E) ☐

72. Which questioning strategy is best in leading you to the answer? Select one group which, by itself, would give you the necessary information to know which item is "IT."

A. Group I . . . . (A) ☐
B. Group II. . . . . (B) ☐
C. Group III . . . . (C) ☐

(Go on to the next page.)

Here are five items:

stove
refrigerator dishwasher
dryer clothes washer

One of these items is "IT." You can learn which one is "IT" by reading the following groups of questions and the answers given for each question.

Question Group I	
1. Does it produce heat?	yes
2. Does it use electricity?	yes
3. Does it require water in order to perform its job?	no

Question Group II	
1. Do you put food in it?	no
2. Do you put clothes in it?	yes
3. Do you put soap in it?	no

Question Group III	
1. Does it have a door that opens and closes?	yes
2. Does it wash things?	no
3. Does it keep things cold?	no

73. Which item is "IT"?

A. stove . . . . (A) ☐
B. refrigerator. . . . . (B) ☐
C. dishwasher . . . . (C) ☐
D. dryer . . . . (D) ☐
E. clothes washer . . . . (E) ☐

74. Which questioning strategy is best in leading you to the answer? Select one group which, by itself, would give you the necessary information to know which item is "IT."

A. Group I . . . . (A) ☐
B. Group II. . . . . (B) ☐
C. Group III . . . . (C) ☐

(Go on to the next page.)

Here are five items:

beet
apple tomato
potato lemon

One of these items is "IT." You can learn which one is "IT" by reading the following groups of questions and the answers given for each question.

Question Group I	
1. Is it brown in color?	no
2. Can you eat it?	yes
3. Does it have a sour taste?	no

Question Group II	
1. Does it grow on a tree?	no
2. Does it have seeds inside it?	no
3. Is it colored red inside?	yes

Question Group III	
1. Can it be used in a salad?	yes
2. Does it grow in the ground?	yes
3. Is it a vegetable?	yes

75. Which item is "IT"?

A. beet . . . . (A) ☐
B. apple . . . . (B) ☐
C. tomato. . . . . (C) ☐
D. potato . . . . (D) ☐
E. lemon. . . . . (E) ☐

76. Which questioning strategy is best in leading you to the answer? Select one group which, by itself, would give you the necessary information to know which item is "IT."

A. Group I . . . . (A) ☐
B. Group II. . . . . (B) ☐
C. Group III . . . . (C) ☐

(This is the end of Section VI.) STOP! Please close your test booklet. Do not open it again until your teacher tells you to do so.

Section VI
Score: ________

77. A bug tries to climb a 10-foot pole. Each day she climbs up two feet. Each night while she sleeps she slips down one foot. How many days will it take her to reach the top of the pole?

A. cannot be solved; not enough information given . . . . (A) ☐
B. can be solved; exactly enough information given . . . . (B) ☐
C. can be solved; extra and unnecessary information given. . . . . (C) ☐

78. There are 96 students in the seventh grade at Crestview Junior High School. They plan to use buses to go on a field trip to the Civic Center. How many buses will they need?

A. cannot be solved; not enough information given . . . . (A) ☐
B. can be solved; exactly enough information given . . . . (B) ☐
C. can be solved; extra and unnecessary information given. . . . . (C) ☐

79. A man fenced his garden so that the fence had the form of a square. When he finished, there were nine fence posts on each side of the square. Each side of the fence was 18 feet long. How many posts did he use?

A. cannot be solved; not enough information given . . . . (A) ☐
B. can be solved; exactly enough information given . . . . (B) ☐
C. can be solved; extra and unnecessary information given. . . . . (C) ☐

80. When 14 is added to a certain number and the sum is then multiplied by 18, the product is 735. What is that certain number?

A. cannot be solved; not enough information given . . . . (A) ☐
B. can be solved; exactly enough information given . . . . (B) ☐
C. can be solved; extra and unnecessary information given. . . . . (C) ☐

81. You must divide a 17-foot board into two pieces so that one piece is five feet longer than the other. How long is each piece?

A. cannot be solved; not enough information given . . . . (A) ☐
B. can be solved; exactly enough information given . . . . (B) ☐
C. can be solved; extra and unnecessary information given. . . . . (C) ☐

82. The odometer on our car reads 31,794 miles. I drive the same distance every day for five days. What does the odometer read now?

A. cannot be solved; not enough information given . . . . (A) ☐
B. can be solved; exactly enough information given . . . . (B) ☐
C. can be solved; extra and unnecessary information given. . . . . (C) ☐

83. Divide a class of 36 students into two groups so that one group is three times as large as the other. There are 20 boys and 16 girls in the class. How large is each group?

(Go on to the next page.)

Section VII. Analysis of Relevant and Irrelevant Information

Time limit: 25 minutes

When you are told to do so, turn the page, read each of the problems, and decide whether the problem:

A. cannot be solved; not enough information given
B. can be solved; exactly enough information given
C. can be solved; extra and unnecessary information given

Example:

Oranges cost 10 cents each at the Littletown Supermarket. How many oranges can a person buy for 50 cents?

A. cannot be solved; not enough information given . . . . (A) ☐
B. can be solved; exactly enough information given . . . . (B) ☒
C. can be solved; extra and unnecessary information given. . . . . (C) ☐

The correct choice is (B), "can be solved; exactly enough information given." There is enough information supplied in this problem so that you can tell how many oranges a person can buy for 50 cents.

You do not need to find number answers to these problems, although you can if you want to. When you have read a problem and decided whether it tells too little, just enough, or too much to be solved, mark the appropriate answer: (A), (B), or (C). Mark only one answer.

A. cannot be solved; not enough information given . . . . (A) ☐
B. can be solved; exactly enough information given . . . . (B) ☐
C. can be solved; extra and unnecessary information given. . . . . (C) ☐

84. Students in the ninth-grade class sold 200 tickets for the class play. Adult tickets were sold for $1.00 and student tickets were sold for 50 cents. How much money did the ninth graders earn for the class treasury?

A. cannot be solved; not enough information given . . . . (A) ☐
B. can be solved; exactly enough information given . . . . (B) ☐
C. can be solved; extra and unnecessary information given. . . . . (C) ☐

85. A car is traveling at 55 miles per hour. It uses gasoline at the rate of 15 miles per gallon. How long will it take the car to travel 165 miles?

A. cannot be solved; not enough information given . . . . (A) ☐
B. can be solved; exactly enough information given . . . . (B) ☐
C. can be solved; extra and unnecessary information given. . . . . (C) ☐

86. Mary has three U.S. coins in her pocket which together have a value of 40 cents. One of them is a dime and one is a nickel. What are the three coins?

A. cannot be solved; not enough information given . . . . (A) ☐
B. can be solved; exactly enough information given . . . . (B) ☐
C. can be solved; extra and unnecessary information given. . . . . (C) ☐

87. It takes four boys and four girls to form one set for square dancing. How many sets can be formed from 32 students.

A. cannot be solved; not enough information given . . . . (A) ☐
B. can be solved; exactly enough information given . . . . (B) ☐
C. can be solved; extra and unnecessary information given. . . . . (C) ☐

88. A horse weighs twice as much as a sheep. A sheep weighs three times as much as a goat. Their total weight is 1500 pounds. How much does each animal weigh?

A. cannot be solved; not enough information given . . . . (A) ☐
B. can be solved; exactly enough information given . . . . (B) ☐
C. can be solved; extra and unnecessary information given. . . . . (C) ☐

89. If you multiply A times B, the product is 476. When A is multiplied by a number one larger than B, the product is 504. Find the values of A and B.

A. cannot be solved; not enough information given . . . . (A) ☐
B. can be solved; exactly enough information given . . . . (B) ☐
C. can be solved; extra and unnecessary information given. . . . . (C) ☐

(Go on to the next page.)

90. In 1974, a person bought 10 shares of stock in an ice cream company. In 1975, the value of the stock had gone up by 50 percent. In 1976, the value of the stock had gone down by 40 percent. How much money was the person's stock worth at that time?

   A. cannot be solved; not enough information given . . . . (A) ☐
   B. can be solved; exactly enough information given . . . . (B) ☐
   C. can be solved; extra and unnecessary information given. . . . . (C) ☐

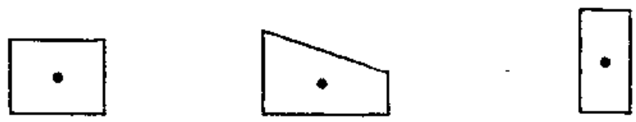
(This is the end of Section VII.) STOP! Please close your test booklet. Do not open it again until your teacher tells you to do so.

Section VII
Score: ___________

Section VIII, Analysis of Attributes

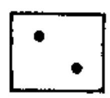
Time limit: 15 minutes

These are Fergs. Look at them carefully.



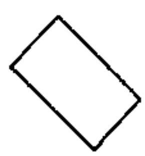
These are not Fergs. Decide how they are different from the Fergs.

Are any of these Fergs?



A. Is a Ferg. . . . . (A) ☐
B. Is not a Ferg. . . . . (B) ☒

A. Is a Ferg. . . . . (A) ☒
B. Is not a Ferg. . . . . (B) ☐



A. Is a Ferg. . . . . (A) ☐
B. Is not a Ferg. . . . . (B) ☒

If you chose the middle figure as a Ferg you are correct. The first and last figures are not Fergs. A Ferg has four sides and one dot inside.

When you are told to do so, study both sets of figures on the next page carefully and decide what features are needed to produce a Flig.

Then study the figures following the models and decide whether each is or is not a Flig.

If it is a Flig, mark answer (A).
If it is not a Flig, mark answer (B).

In this test section, you will also be asked to identify Frims and Nagems. Follow the same procedure for these figures.

These are Fligs:

These are not Fligs:

Are any of these Fligs?
If it is a Flig, mark answer (A).
If it is not a Flig, mark answer (B).

91.

A. Is a Flig . . . . (A) ☐
B. Is not a Flig . . . . (B) ☐

92.

A. Is a Flig . . . . (A) ☐
B. Is not a Flig . . . . (B) ☐

93.

A. Is a Flig . . . . (A) ☐
B. Is not a Flig . . . . (B) ☐

94.

A. Is a Flig . . . . (A) ☐
B. Is not a Flig . . . . (B) ☐

95.

A. Is a Flig . . . . (A) ☐
B. Is not a Flig . . . . (B) ☐

(Go on to the next page.)

These are Frims:

These are not Frims:

Are any of these Frims?
If it is a Frim, mark answer (A).
If it is not a Frim, mark answer (B).

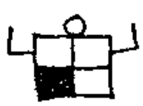
96.

A. Is a Frim . . . . (A) ☐
B. Is not a Frim . . . . (B) ☐

97.

A. Is a Frim . . . . (A) ☐
B. Is not a Frim . . . . (B) ☐

98.



A. Is a Frim . . . . (A) ☐
B. Is not a Frim . . . . (B) ☐

99.

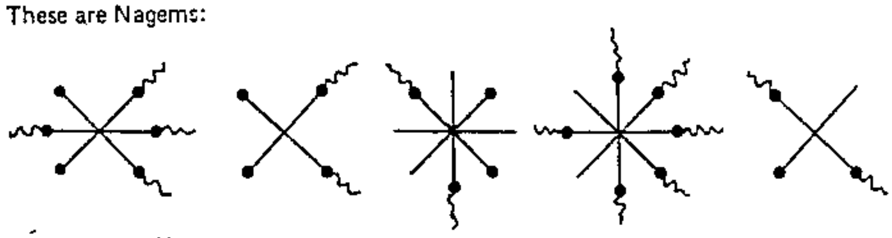
A. Is a Frim . . . . (A) ☐
B. Is not a Frim . . . . (B) ☐

100.

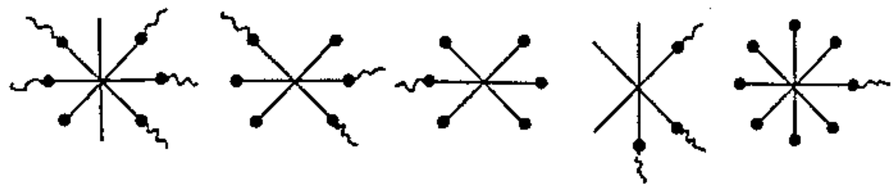
A. Is a Frim . . . . (A) ☐
B. Is not a Frim . . . . (B) ☐

(Go on to the next page.)

These are Nagems:

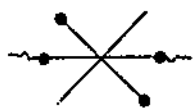


These are not Nagems:



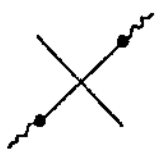
Are any of these Nagems?
If it is a Nagem, mark answer (A).
If it is not a Nagem, mark answer (B).

101.



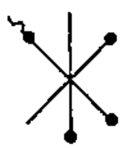
A. Is a Nagem. (A) ☐
B. Is not a Nagem. . . . . (B) ☐

102.



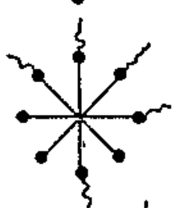
A. Is a Nagem. (A) ☐
B. Is not a Nagem. . . . . (B) ☐

103.



A. Is a Nagem. (A) ☐
B. Is not a Nagem. . . . . (B) ☐

104.



A. Is a Nagem. (A) ☐
B. Is not a Nagem. . . . . (B) ☐

105.

A. Is a Nagem. (A) ☐
B. Is not a Nagem. . . . . (B) ☐

(This is the end of Section VIII.) STOP! Please close your test booklet.
Do not open it again until your teacher tells you to do so.

Section VIII
Score: ________

APPENDIX B

ROSS TEST OF HIGHER COGNITIVE PROCESSES DATA

Data for Grade Five
Ross Test

ID	GNDR	GRP	ANAL	SYN	EVAL	TAAS
501	1	1	19	16	17	171
502	1	1	17	24	20	170
503	1	1	22	20	24	187
504	1	1	22	28	23	187
505	1	1	20	21	20	174
506	1	1	20	20	22	177
507	1	1	14	23	16	180
508	1	1	22	19	17	174
509	1	1	25	25	24	186
510	1	1	15	17	18	182
511	1	1	14	11	15	171
512	1	1	13	18	20	172
513	1	1	13	16	22	162
514	1	1	19	22	19	.
515	1	1	24	27	25	174
516	1	1	14	28	14	161
517	1	1	29	32	29	184
518	1	1	21	29	19	187
519	1	1	24	20	24	181
520	2	1	22	17	17	180
521	2	1	16	17	19	163
522	2	1	19	26	22	169
524	2	1	15	20	21	180
525	2	1	19	26	20	181
526	2	1	20	24	24	185
527	2	1	17	16	21	180
529	2	1	18	19	24	.
530	2	1	17	19	20	178
531	2	1	20	18	20	184
532	2	1	18	10	16	162
533	2	1	10	18	18	182
534	2	1	17	18	19	177
535	2	1	22	27	23	178
536	2	1	19	24	24	184
537	2	1	20	20	22	180
538	2	1	18	24	15	174
539	2	1	30	26	26	186
540	2	1	25	28	22	186
541	2	1	24	23	27	179
584	2	1	23	23	19	182
590	2	1	17	21	20	166
591	2	1	24	23	21	181
592	2	1	14	17	18	182
593	2	1	18	23	14	179
594	1	1	22	23	16	.

Data for Grade Five
Ross Test

ID	GNDR	GRP	ANAL	SYN	EVAL	TAAS
542	1	0	22	24	15	175
543	1	0	28	26	15	183
544	1	0	20	18	11	184
546	1	0	14	16	12	187
548	1	0	19	19	11	180
549	1	0	18	28	12	184
550	1	0	28	27	17	180
551	1	0	24	26	15	186
552	1	0	15	21	13	176
553	1	0	13	20	9	162
554	1	0	15	19	10	170
555	1	0	24	26	10	171
556	1	0	14	22	10	189
557	1	0	27	26	12	187
558	1	0	13	21	12	176
559	1	0	14	24	11	175
560	1	0	19	24	10	186
561	1	0	24	33	14	184
562	1	0	22	27	15	176
563	1	0	12	20	13	172
564	1	0	17	18	11	172
565	1	0	21	29	12	182
566	1	0	19	25	13	181
569	2	0	23	18	23	182
570	2	0	22	31	24	187
571	2	0	17	28	25	181
572	2	0	17	21	18	149
573	2	0	17	17	20	180
574	2	0	19	17	19	168
575	2	0	18	27	10	183
576	2	0	18	23	17	184
577	2	0	25	20	19	182
579	2	0	16	19	22	173
580	2	0	12	19	13	156
582	2	0	31	33	29	185
582	2	0	15	10	13	161
583	2	0	26	32	20	184
585	2	0	12	23	14	182
586	2	0	17	16	20	171
587	2	0	9	24	16	169
588	2	0	27	30	18	189
589	2	0	17	21	16	171

Data Grade Six
Ross Test

ID	GNDR	GRP	ANAL	SYN	EVAL	TAAS
601	1	1	30	29	22	183
602	1	1	25	26	29	189
603	1	1	30	28	23	178
604	1	1	28	26	25	191
605	1	1	28	22	28	193
606	1	1	21	19	22	174
607	1	1	22	24	19	184
608	1	1	20	20	23	191
609	1	1	26	22	18	184
610	1	1	18	25	18	174
611	1	1	21	19	21	184
612	1	1	24	31	27	188
613	1	1	25	19	26	177
614	1	1	28	32	20	193
615	1	1	30	33	26	185
616	1	1	20	22	17	181
617	1	1	23	20	19	179
618	1	1	13	15	21	172
619	1	1	29	31	26	189
620	2	1	21	21	25	160
621	2	1	15	15	19	188
622	2	1	26	27	18	186
623	2	1	27	31	23	190
624	2	1	25	30	21	188
625	2	1	28	33	26	186
626	2	1	19	27	22	177
627	2	1	25	21	22	184
628	2	1	26	32	24	191
629	2	1	25	30	28	193
630	2	1	20	23	13	181
632	2	1	23	30	22	184
668	2	1	29	38	26	193
678	2	1	26	35	25	188
683	2	1	25	30	22	191
686	2	1	18	25	18	178
691	1	1	21	22	15	179

Data Grade Six
Ross Test

ID	GNDR	GRP	ANAL	SYN	EVAL	TAAS
634	1	0	19	21	19	141
635	1	0	12	11	16	168
637	1	0	21	28	17	181
639	1	0	23	21	19	170
640	1	0	114	26	13	179
641	1	0	26	23	21	193
642	1	0	7	17	13	154
643	1	0	28	28	23	193
644	1	0	18	18	18	172
645	1	0	20	30	22	193
646	1	0	18	27	18	152
649	1	0	17	15	17	152
650	1	0	17	27	19	188
651	1	0	25	32	15	183
653	1	0	26	22	25	161
654	1	0	24	27	15	185
655	1	0	27	29	23	191
656	1	0	26	35	28	180
657	1	0	29	28	25	193
660	2	0	17	22	8	183
661	2	0	13	16	18	172
662	2	0	19	22	20	170
664	2	0	25	32	21	190
667	2	0	20	31	19	169
669	2	0	16	30	21	148
670	2	0	16	14	19	188
673	2	0	24	18	21	184
674	2	0	25	32	21	186
675	2	0	22	30	24	176
676	2	0	18	22	20	174
679	2	0	24	27	20	190
680	2	0	20	26	23	173
681	2	0	25	22	14	172
682	2	0	25	22	14	182
684	2	0	26	29	26	193
688	2	0	16	18	17	170
689	2	0	19	19	17	177
690	1	0	19	13	21	177
692	2	0	17	22	15	193
693	2	0	14	12	13	182
694	2	0	15	15	22	178
695	2	0	17	12	15	153
696	2	0	20	18	19	163

APPENDIX C

COMPUTER ATTITUDE QUESTIONNAIRE

Computer Attitude Questionnaire

Name: ______________________

This survey consists of 6 parts. Within each part, read each statement and then circle the number which best shows how you feel.

SD = Strongly Disagree D = Disagree A = Agree SA = Strongly Agree

Part 1

		SD	D	A	SA
(1)	I enjoy doing things on a computer.	1	2	3	4
(2)	I am tired of using a computer.	1	2	3	4
(3)	I will be able to get a good job if I learn how to use a computer.	1	2	3	4
(4)	I concentrate on a computer when I use one.	1	2	3	4
(5)	I enjoy computer games very much.	1	2	3	4
(6)	I would work harder if I could use computers more often.	1	2	3	4
(7)	I know that computers give me opportunities to learn many new things.	1	2	3	4
(8)	I can learn many things when I use a computer.	1	2	3	4
(9)	I enjoy lessons on the computer.	1	2	3	4
(10)	I believe that the more often teachers use computers, the more I will enjoy school.	1	2	3	4
(11)	I believe that it is very important for me to learn how to use a computer.	1	2	3	4
(12)	I feel comfortable working with a computer.	1	2	3	4
(13)	I get a sinking feeling when I think of trying to use a computer.	1	2	3	4
(14)	I think that it takes a long time to finish when I use a computer.	1	2	3	4
(15)	Computers do not scare me at all.	1	2	3	4
(16)	Working with a computer makes me nervous.	1	2	3	4
(17)	Using a computer is very frustrating.	1	2	3	4
(18)	I will do as little work with computers as possible.	1	2	3	4
(19)	Computers are difficult to use.	1	2	3	4
(20)	I can learn more from books than from a computer.	1	2	3	4

Go On

SD = Strongly Disagree D = Disagree A = Agree SA = Strongly Agree

Part 2

		SD	D	A	SA
(21)	I study by myself without anyone forcing me to study.	1	2	3	4
(22)	If I do not understand something, I will not stop thinking about it.	1	2	3	4
(23)	When I don't understand a problem, I keep working until I find the answer.	1	2	3	4
(24)	I review my lessons every day.	1	2	3	4
(25)	I try to finish whatever I begin.	1	2	3	4
(26)	Sometimes, I change my way of studying.	1	2	3	4
(27)	I enjoy working on a difficult problem.	1	2	3	4
(28)	I think about many ways to solve a difficult problem.	1	2	3	4
(29)	I never forget to do my homework.	1	2	3	4
(30)	I like to work out problems which I can use in my life every day.	1	2	3	4
(31)	If I do not understand my teacher, I ask him/her questions.	1	2	3	4
(32)	I listen to my teacher carefully.	1	2	3	4
(33)	If I fail, I try to find out why.	1	2	3	4
(34)	I study hard.	1	2	3	4
(35)	When I do a job, I do it well.	1	2	3	4

SD = Strongly Disagree D = Disagree A = Agree SA = Strongly Agree

Part 3

		SD	D	A	SA
(36)	I feel sad when I see a child crying.	1	2	3	4
(37)	I sometimes cry when I see a sad play or movie.	1	2	3	4
(38)	I get angry when I see a friend who is treated badly.	1	2	3	4
(39)	I feel sad when I see old people alone.	1	2	3	4
(40)	I worry when I see a sad friend.	1	2	3	4
(41)	I feel very happy when I listen to a song I like.	1	2	3	4
(42)	I do not like to see a child play alone, without a friend.	1	2	3	4
(43)	I feel sad when I see an animal hurt.	1	2	3	4
(44)	I feel happy when I see a friend smiling.	1	2	3	4
(45)	I am glad to do work that helps others.	1	2	3	4

Go On

SD = Strongly Disagree D = Disagree A = Agree SA = Strongly Agree

Part 4

		SD	D	A	SA
(46)	I examine unusual things.	1	2	3	4
(47)	I find new things to play with or to study, without any help.	1	2	3	4
(48)	When I think of a new thing, I apply what I have learned before.	1	2	3	4
(49)	I tend to consider various ways of thinking.	1	2	3	4
(50)	I create many unique things.	1	2	3	4
(51)	I do things by myself without depending upon others.	1	2	3	4
(52)	I find different kinds of materials when the ones I have do not work or are not enough.	1	2	3	4
(53)	I examine unknown issues to try to understand them.	1	2	3	4
(54)	I make a plan before I start to solve a problem.	1	2	3	4
(55)	I invent games and play them with friends.	1	2	3	4
(56)	I invent new methods when one way does not work.	1	2	3	4
(57)	I choose my own way without imitating methods of others.	1	2	3	4
(58)	I tend to think about the future.	1	2	3	4

Go On

Part 5

(59) Which would you rather do? (circle one of each pair):

(1) read a book	or	(2) write	59
(1) write	or	(2) watch television	60
(1) watch television	or	(2) use a computer	61
(1) use a computer	or	(2) read a book	62
(1) read a book	or	(2) watch television	63
(1) write	or	(2) use a computer	64

(60) Which would be more difficult for you (circle one of each pair):

(1) read a book	or	(2) write	65
(1) write	or	(2) watch television	66
(1) watch television	or	(2) use a computer	67
(1) use a computer	or	(2) read a book	68
(1) read a book	or	(2) watch television	69
(1) write	or	(2) use a computer	70

(61) Which would you learn more from (circle one of each pair):

(1) read a book	or	(2) write	71
(1) write	or	(2) watch television	72
(1) watch television	or	(2) use a computer	73
(1) use a computer	or	(2) read a book	74
(1) read a book	or	(2) watch television	75
(1) write	or	(2) use a computer	76

Part 6

Part 6

SD = Strongly Disagree D = Disagree A = Agree SA = Strongly Agree

		SD	D	A	SA	
(62)	I really like school.	1	2	3	4	(77)
(63)	School is boring.	1	2	3	4	(78)
(64)	I would like to work in a school when I grow up.	1	2	3	4	(79)
(65)	When I grow up I would not like to work in a school.	1	2	3	4	(80)

(66) How many years did you use a computer in elementary school (circle one)?

0 (never used)
< 1 (less than 1 year)
1
2
3
4
5
6
> 6, please write in ___

(67) How many years have you used a computer at home (circle one)?

0 (never used)
< 1 (less than 1 year)
1
2
3
4
5
6
> 6, please write in ___

(68) Do you have World Wide Web (WWW) access at home? 1 = yes 2 = no

(End)

Thank you!
CAQ Ver 5.15

APPENDIX D

COMPUTER ATTITUDE QUESTIONNAIRE DATA

Data Grade Five
CAQ

ID	GNDR	AGE	GRP	IMP	ENJ	MOT	STH	EMP	CRE	ANX	SEC
501	2	11	1	2.43	2.67	2.44	2.60	3.10	3.77	2.50	3.08
502	2	11	1	2.71	3.00	2.00	2.50	2.60	3.62	2.25	2.62
503	1	11	1	2.86	2.78	2.33	2.90	3.60	3.62	1.88	2.77
504	1	12	1	3.00	2.00	2.56	2.70	2.60	2.69	1.50	2.54
505	2	11	1	2.71	2.33	2.22	2.40	3.40	3.62	1.50	2.62
506	1	11	1	2.71	3.00	2.56	2.70	3.00	3.31	2.63	2.15
507	2	11	1	2.57	2.56	2.44	2.50	2.50	2.54	2.13	2.54
508	1	11	1	3.29	2.78	2.22	2.40	3.50	3.23	1.63	2.46
509	1	11	1	2.86	3.11	2.33	3.10	2.70	3.23	1.50	2.31
510	1	11	1	3.00	2.78	2.22	2.70	3.20	3.69	2.13	2.54
511	1	11	1	1.71	2.22	2.00	1.90	2.30	2.23	2.50	2.15
512	2	11	1	2.71	2.56	2.67	3.10	3.40	3.92	1.50	2.69
513	2	11	1	3.00	2.67	2.33	3.00	3.10	3.23	1.88	2.77
514	1	11	1	2.43	2.33	2.44	2.70	2.70	2.92	2.13	2.54
515	2	11	1	2.86	2.78	2.33	2.30	2.80	3.08	2.00	2.62
516	2	11	1	2.86	3.11	2.67	2.80	3.50	3.77	1.88	2.69
517	2	11	1	2.57	2.44	2.78	2.80	3.20	3.38	1.50	2.69
518	1	12	1	2.86	2.67	2.56	2.50	2.80	3.38	1.88	2.54
519	2	11	1	1.71	2.56	2.78	2.70	2.60	3.69	2.63	2.69
520	2	11	1	1.71	2.56	2.78	2.70	2.60	3.69	2.63	2.69
521	1	11	1	2.14	2.56	1.89	2.50	2.70	3.15	2.25	2.38
522	2	12	1	2.57	2.78	1.67	2.20	3.00	3.00	1.88	2.08
523	2	11	1	2.57	2.56	2.00	2.60	2.80	3.38	2.00	2.15
524	2	11	1	3.14	2.89	2.22	2.80	3.50	3.31	2.00	2.46
525	1	11	1	3.14	2.67	1.89	2.90	3.50	3.62	1.75	2.54
526	2	11	1	2.43	2.44	2.11	2.60	2.90	3.46	1.75	2.62
527	2	11	1	3.29	2.67	2.11	2.30	2.20	3.46	1.63	2.31
528	1	11	1	2.86	2.56	2.22	2.30	2.50	3.38	1.88	2.31
529	1	11	1	2.71	2.56	2.00	2.60	2.40	3.31	2.00	2.38
530	1	12	1	3.29	2.78	2.89	3.50	3.50	3.54	1.75	3.00
531	2	12	1	2.71	2.78	2.44	2.90	2.90	3.15	1.75	2.69
532	1	11	1	3.43	2.67	2.44	2.70	3.70	4.00	1.38	2.62
533	1	11	1	2.57	2.78	2.00	2.70	2.80	3.23	2.63	2.46
534	2	11	1	2.57	2.78	2.56	2.70	2.80	3.23	2.00	2.31
535	2	11	1	2.71	2.67	2.22	2.60	3.20	3.15	1.75	2.08
536	2	11	1	2.86	2.67	2.22	2.50	3.20	3.31	1.88	2.54
537	1	11	1	3.14	2.67	2.89	3.10	2.60	2.92	2.00	2.92
538	1	11	1	3.43	2.78	2.67	2.80	2.90	2.92	1.50	2.77
539	2	11	1	2.29	2.56	1.89	2.50	2.60	3.38	2.00	2.54
540	1	11	1	2.43	3.00	2.11	2.30	2.70	2.85	2.38	2.15
541	2	11	1	3.29	2.89	2.56	2.50	2.80	2.92	1.88	2.54

Data Grade Five
CAQ

ID	GNDR	AGE	GRP	IMP	ENJ	MOT	STH	EMP	CRE	ANX	SEC
542	1	11	0	3.00	2.89	2.33	2.60	2.20	2.15	2.00	2.77
543	1	11	0	3.14	3.00	2.22	2.70	3.30	3.69	1.63	2.23
544	1	11	0	2.71	2.78	2.22	2.60	3.00	3.46	1.38	2.15
545	1	10	0	2.43	2.78	1.67	1.90	2.20	2.31	2.25	2.31
546	1	10	0	3.00	2.78	2.44	2.80	3.70	3.69	1.38	2.46
547	1	11	0	2.14	2.67	2.22	2.50	2.70	2.77	2.13	2.38
548	1	11	0	3.14	2.22	2.11	2.70	3.40	3.23	1.88	2.54
549	1	11	0	3.14	2.89	2.33	2.60	2.80	2.92	2.00	2.46
550	2	11	0	2.71	2.44	2.11	2.60	2.30	3.31	1.88	2.46
551	1	10	0	2.00	2.56	1.78	2.10	2.70	2.62	1.88	2.00
552	2	11	0	2.29	2.89	2.89	2.70	2.50	2.54	2.38	2.54
553	1	11	0	3.29	3.00	2.33	2.60	2.90	3.00	2.13	2.46
554	2	11	0	3.00	2.67	1.89	2.30	3.20	3.69	2.25	2.54
555	1	10	0	2.86	2.44	2.33	2.70	2.60	2.62	2.38	2.77
556	1	11	0	3.14	2.78	1.78	2.50	2.50	3.38	1.75	2.54
557	1	11	0	2.71	3.00	2.67	2.20	2.60	3.00	2.75	2.92
558	1	10	0	2.29	2.89	2.22	2.40	2.60	2.54	1.88	2.15
559	1	10	0	2.00	2.78	2.22	2.70	2.60	2.69	2.50	2.38
560	1	12	0	2.57	2.89	2.33	2.70	2.70	2.23	2.38	2.69
561	2	11	0	2.57	2.56	2.11	2.70	3.00	3.15	1.88	2.54
562	2	10	0	2.57	2.78	2.11	2.50	3.20	3.77	2.25	2.31
563	2	10	0	2.86	2.33	2.44	2.90	3.10	4.00	1.38	2.62
564	2	10	0	2.57	2.89	2.56	2.90	2.60	3.08	2.13	2.69
565	1	11	0	2.29	3.11	2.33	2.30	2.50	3.00	2.50	2.62
566	1	11	0	2.57	2.89	2.22	2.60	3.20	3.23	2.00	2.54
567	1	11	0	3.43	2.78	2.56	2.90	3.60	4.00	1.50	2.69
568	2	11	0	2.14	2.44	2.11	2.30	2.00	3.31	2.13	2.46
569	1	10	0	3.14	2.44	3.00	3.40	3.40	3.23	1.38	3.00
570	1	11	0	2.71	2.78	1.89	2.40	2.90	3.46	2.63	2.38
571	1	11	0	2.29	2.56	2.11	2.80	3.30	2.62	1.75	2.23
572	1	11	0	2.86	2.56	2.56	2.90	3.10	3.15	2.25	3.08
573	2	11	0	1.57	2.56	2.44	2.60	2.60	3.15	2.25	2.69
574	2	11	0	1.86	2.22	2.44	3.00	3.30	3.23	2.13	2.38
575	2	11	0	2.71	2.89	2.22	2.60	3.00	3.00	2.00	2.38
576	2	10	0	2.29	2.44	1.56	2.60	3.40	3.54	1.88	2.54
577	2	11	0	2.14	2.22	2.11	2.40	3.10	3.38	1.50	2.38
578	2	12	0	2.14	2.22	2.00	2.40	2.30	3.15	2.50	2.77
579	1	.	0	2.14	2.56	2.11	2.60	2.70	1.77	2.50	2.31
580	1	.	0	1.29	2.22	1.78	2.50	2.80	2.54	1.75	2.00
581	1	.	0	2.86	2.22	2.33	2.60	2.80	4.00	1.50	2.23
582	1	.	0	2.71	2.78	2.00	2.30	2.60	3.00	2.00	2.54

Data Grade Six
CAQ

ID	GNDR	AGE	GRP	IMP	ENJ	MOT	STH	EMP	CRE	ANX	SEC
601	2	11	1	3.14	2.67	2.78	2.90	3.30	3.38	1.75	2.69
604	1	12	1	3.43	3.00	2.22	2.30	3.00	3.54	2.00	2.62
605	1	12	1	2.57	2.56	2.44	2.90	2.90	2.69	2.25	2.85
606	2	12	1	3.43	3.00	2.33	2.40	2.70	3.85	1.63	2.38
610	1	11	1	2.86	3.11	2.11	2.40	2.80	3.00	2.38	2.46
614	2	11	1	3.00	2.56	2.11	2.40	3.30	3.92	1.50	2.54
617	1	12	1	2.71	2.89	2.11	2.30	3.00	2.92	1.63	2.23
623	2	11	1	2.86	3.00	2.11	2.20	2.80	3.08	2.13	2.31
624	1	12	1	2.29	2.67	2.00	2.30	2.30	2.69	2.13	2.15
625	1	12	1	2.57	2.78	2.22	2.30	1.80	2.92	2.00	2.38
626	2	12	1	3.43	2.89	1.89	2.30	3.40	3.69	1.75	2.31
633	2	11	1	3.00	2.78	2.44	2.60	2.80	3.46	1.63	2.38
636	1	12	1	2.43	2.78	1.67	2.10	2.60	3.31	2.13	2.15
637	2	11	1	2.43	2.67	2.33	2.30	3.00	3.00	2.25	2.54
639	2	12	1	3.00	2.33	2.33	2.60	3.10	3.69	1.50	2.54
643	2	12	1	2.43	2.33	2.33	2.60	2.50	3.00	1.75	2.23
646	2	12	1	2.71	2.67	2.56	2.80	3.60	3.69	1.88	2.62
648	1	12	1	2.71	2.67	2.44	2.60	2.80	3.00	1.88	2.38
656	1	12	1	3.29	2.78	2.33	2.80	3.40	3.46	1.50	2.54
657	1	12	1	3.14	2.67	2.11	2.50	2.50	2.38	2.25	2.54
660	1	12	1	2.86	3.00	2.44	2.40	2.60	3.15	2.00	2.31
667	2	11	1	2.86	3.00	1.78	2.60	2.80	2.69	2.63	2.38
670	1	12	1	2.71	2.78	1.89	2.30	2.90	3.00	1.75	2.08
671	1	11	1	2.57	2.56	2.33	2.90	2.90	2.92	1.50	2.69
672	1	11	1	3.14	2.78	2.22	2.80	2.80	2.46	1.75	2.31
674	1	12	1	3.43	2.89	2.33	2.60	2.80	3.31	1.88	2.77
678	1	12	1	2.57	3.44	2.00	2.40	2.40	3.46	2.75	2.38
679	1	11	1	3.29	2.67	2.44	2.50	2.90	3.08	1.88	2.77
680	2	11	1	3.14	2.56	2.00	2.20	3.40	3.77	2.00	2.92
683	2	12	1	3.14	2.78	2.22	2.60	3.40	3.38	1.75	2.15
686	1	11	1	2.57	2.89	2.33	2.60	2.40	3.08	2.50	2.69
690	1	11	1	2.29	2.56	1.89	2.00	2.40	2.46	2.00	1.92

Data Grade Six
CAQ

ID	GNDR	AGE	GRP	IMP	ENJ	MOT	STH	EMP	CRE	ANX	SEC
602	1	.	0	3.43	2.78	2.33	2.60	3.10	3.46	1.50	2.54
603	1	12	0	3.00	2.56	2.22	2.70	3.30	2.85	1.75	2.23
607	2	11	0	2.57	3.00	1.89	2.30	2.30	3.38	2.00	2.23
608	1	12	0	2.57	2.78	1.89	2.10	2.40	2.31	2.25	2.38
609	1	.	0	2.43	2.44	2.56	2.50	2.80	3.08	2.13	2.69
611	2	12	0	3.14	2.89	2.22	2.10	2.50	3.31	2.25	2.62
612	1	12	0	2.57	3.44	2.00	2.40	2.40	3.46	2.75	2.38
613	2	11	0	3.00	2.78	2.44	2.70	2.80	3.46	1.88	2.85
615	1	.	0	3.00	2.56	2.33	2.30	3.10	3.46	1.63	2.46
616	2	.	0	2.00	2.67	2.56	2.90	2.80	3.31	1.75	2.46
618	2	11	0	3.00	2.67	2.44	2.60	3.20	3.77	1.63	2.62
619	2	12	0	3.14	2.67	2.11	2.50	3.00	3.08	1.75	2.38
620	2	.	0	3.14	2.89	2.44	2.80	3.10	3.23	2.13	2.92
621	1	12	0	3.14	2.56	2.22	2.50	3.10	2.92	1.88	2.62
622	2	11	0	2.43	2.44	2.22	2.50	2.80	3.15	1.88	2.31
627	2	12	0	1.86	2.56	2.56	2.50	3.30	3.23	1.63	2.08
628	2	12	0	2.71	2.56	1.78	1.90	2.30	3.08	2.13	2.46
629	2	12	0	2.43	2.33	1.78	2.10	2.50	3.62	2.00	2.38
630	2	11	0	2.43	2.67	2.11	2.40	2.50	3.15	2.63	2.69
631	1	12	0	2.86	3.11	2.00	2.10	2.20	2.85	2.50	2.38
632	2	11	0	3.00	2.78	2.44	2.40	3.10	3.08	2.00	2.69
634	1	12	0	2.57	2.67	1.56	2.70	3.30	3.15	2.13	2.69
635	1	11	0	3.00	2.67	2.33	2.60	2.90	3.69	2.38	2.85
638	1	12	0	2.86	2.56	2.33	2.80	3.10	3.31	1.63	2.31
640	2	12	0	3.00	2.56	2.22	2.80	2.90	3.92	1.63	2.62
641	2	12	0	3.00	2.67	2.11	2.20	2.70	3.15	2.00	2.38
642	2	11	0	2.71	2.89	2.44	2.50	3.00	3.54	1.75	2.08
644	2	.	0	3.14	2.67	2.33	2.30	2.80	3.31	2.25	2.62
645	2	12	0	2.29	2.78	1.56	2.50	2.40	3.31	2.13	2.08
647	1	12	0	3.29	2.78	2.00	2.70	3.10	3.46	1.75	2.31

Data Grade Six
CAQ

ID	GNDR	AGE	GRP	IMP	ENJ	MOT	STH	EMP	CRE	ANX	SEC
649	1	12	0	3.00	2.78	2.56	2.70	3.30	3.69	1.63	2.62
650	1	11	0	3.00	2.56	2.00	2.40	2.90	2.77	2.13	2.54
651	2	.	0	2.86	2.56	2.22	2.50	3.50	3.38	1.75	2.23
652	1	.	0	3.43	3.22	1.89	2.70	3.40	3.85	2.00	2.69
653	1	.	0	2.86	2.78	2.33	2.20	2.30	2.92	2.13	2.62
654	2	12	0	2.86	2.56	2.11	2.80	3.30	3.69	1.63	2.15
655	1	11	0	2.71	2.44	1.56	1.70	2.00	3.15	2.38	2.08
658	1	11	0	2.43	2.56	2.33	2.60	2.50	2.62	2.38	2.46
659	2	12	0	3.14	2.78	2.44	2.60	3.40	3.54	2.13	2.62
661	1	11	0	2.86	2.67	1.89	2.50	3.20	3.69	1.63	2.23
662	2	11	0	2.00	2.89	2.00	2.40	2.60	2.92	2.75	2.31
663	1	.	0	1.43	2.67	2.22	2.60	2.70	2.69	2.75	2.62
664	1	12	0	3.00	2.67	2.22	2.60	3.40	3.00	1.63	2.46
665	2	12	0	2.57	2.67	2.33	2.90	3.20	3.54	1.88	2.62
666	2	.	0	2.86	2.67	2.22	2.30	2.40	2.85	2.00	2.54
668	1	12	0	3.14	3.00	2.22	2.70	3.20	2.46	2.38	2.62
669	1	12	0	2.57	2.78	2.00	2.40	2.60	3.23	2.13	2.31
673	1	11	0	3.00	2.89	2.22	2.30	2.80	2.31	4.25	3.62
675	1	12	0	2.86	3.11	2.22	2.50	3.30	3.23	2.25	2.46
676	1	12	0	2.43	2.33	1.67	2.00	5.50	2.69	2.13	2.00
677	2	11	0	2.86	2.56	2.33	2.10	2.40	3.31	2.25	2.62
681	2	12	0	3.14	2.78	1.89	2.20	2.80	3.23	2.13	2.23
682	2	.	0	3.00	2.67	2.33	2.40	2.30	3.54	2.13	2.38
684	2	.	0	2.29	2.44	2.44	2.30	2.60	2.85	2.25	2.46
685	2	11	0	1.86	2.22	2.33	2.40	2.70	3.00	2.25	2.38
687	1	12	0	3.00	2.89	1.56	2.20	2.80	3.08	1.63	2.31
688	2	11	0	2.43	3.00	2.56	2.80	2.80	3.38	2.75	2.92
689	2	11	0	2.57	2.56	2.56	2.50	2.50	3.15	2.38	2.54

APPENDIX E

STATISTICAL DATA

Grade 5: Ross Test Data

Oneway

Descriptives

TAASTOT

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	42	177.50	9.06	1.40	174.68	180.32	149	189
1	42	177.57	7.35	1.13	175.28	179.86	161	187
Total	84	177.54	8.20	.89	175.76	179.31	149	189

Test of Homogeneity of Variances

TAASTOT

Levene Statistic	df1	df2	Sig.
1.588	1	82	.211

ANOVA

TAASTOT

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.107	1	.107	.002	.968
Within Groups	5576.786	82	68.010		
Total	5576.893	83			

Grade 5: Ross Test Data

Oneway

Descriptives

ANAL

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	42	19.05	5.23	.81	17.42	20.68	9	31
1	45	19.36	4.22	.63	18.09	20.62	10	30
Total	87	19.21	4.71	.50	18.20	20.21	9	31

Test of Homogeneity of Variances

ANAL

Levene Statistic	df1	df2	Sig.
2.486	1	85	.119

ANOVA

ANAL

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.060	1	2.060	.092	.762
Within Groups	1904.216	85	22.403		
Total	1906.276	86			

Grade 5: Ross Test Data

Oneway

Descriptives

SYN

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	42	23.05	5.17	.80	21.44	24.66	10	33
1	45	21.47	4.67	.70	20.06	22.87	10	32
Total	87	22.23	4.95	.53	21.17	23.28	10	33

Test of Homogeneity of Variances

SYN

Levene Statistic	df1	df2	Sig.
.530	1	85	.469

ANOVA

SYN

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	54.298	1	54.298	2.248	.137
Within Groups	2053.105	85	24.154		
Total	2107.402	86			

Grade 5: Ross Test Data

Oneway

Descriptives

EVAL

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	42	15.21	4.72	.73	13.74	16.69	9	29
1	45	20.36	3.49	.52	19.31	21.40	14	29
Total	87	17.87	4.85	.52	16.84	18.91	9	29

Test of Homogeneity of Variances

EVAL

Levene Statistic	df1	df2	Sig.
3.673	1	85	.059

ANOVA

EVAL

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	574.227	1	574.227	33.629	.000
Within Groups	1451.383	85	17.075		
Total	2025.609	86			

Grade 5: Ross Test Data

Oneway

Descriptives

TOTAL

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	42	57.31	11.70	1.81	53.66	60.96	38	93
1	45	61.18	10.19	1.52	58.12	64.24	40	90
Total	87	59.31	11.06	1.19	56.95	61.67	38	93

Test of Homogeneity of Variances

TOTAL

Levene Statistic	df1	df2	Sig.
.759	1	85	.386

ANOVA

TOTAL

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	325.067	1	325.067	2.712	.103
Within Groups	10187.554	85	119.854		
Total	10512.621	86			

Grade 6: Ross Test Data Analysis

Oneway

Descriptives

TAASTOT

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	43	176.09	13.77	2.10	171.86	180.33	141	193
1	36	184.06	7.25	1.21	181.60	186.51	160	193
Total	79	179.72	11.90	1.34	177.06	182.39	141	193

Test of Homogeneity of Variances

TAASTOT

Levene Statistic	df1	df2	Sig.
12.563	1	77	.001

ANOVA

TAASTOT

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1242.357	1	1242.357	9.764	.003
Within Groups	9797.517	77	127.240		
Total	11039.873	78			

Grade 6: Ross Test Data Analysis

Univariate Analysis of Variance

Between-Subjects Factors

		N
GRP	0	43
	1	36

Descriptive Statistics

Dependent Variable: ANAL

GRP	Mean	Std. Deviation	N
0	22.53	15.07	43
1	23.89	4.28	36
Total	23.15	11.44	79

Grade 6: Ross Test Data Analysis

Tests of Between-Subjects Effects

Dependent Variable: ANAL

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	521.468[a]	2	260.734	2.044	.137
Intercept	85.715	1	85.715	.672	.415
TAASTOT	485.544	1	485.544	3.807	.055
GRP	3.047	1	3.047	.024	.878
Error	9692.710	76	127.536		
Total	52559.000	79			
Corrected Total	10214.177	78			

a. R Squared = .051 (Adjusted R Squared = .026)

Estimated Marginal Means

GRP

Dependent Variable: ANAL

GRP	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
0	23.343[a]	1.771	19.815	26.870
1	22.924[a]	1.946	19.048	26.800

a. Evaluated at covariates appeared in the model: TAASTOT = 179.72.

Grade 6: Ross Test Data Analysis

Univariate Analysis of Variance

Between-Subjects Factors

		N
GRP	0	43
	1	36

Descriptive Statistics

Dependent Variable: SYN

GRP	Mean	Std. Deviation	N
0	23.00	6.43	43
1	25.92	5.70	36
Total	24.33	6.25	79

Grade 6: Ross Test Data Analysis

Tests of Between-Subjects Effects

Dependent Variable: SYN

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	578.301[a]	2	289.150	8.914	.000
Intercept	46.660	1	46.660	1.439	.234
TAASTOT	411.608	1	411.608	12.690	.001
GRP	28.697	1	28.697	.885	.350
Error	2465.142	76	32.436		
Total	49804.000	79			
Corrected Total	3043.443	78			

a. R Squared = .190 (Adjusted R Squared = .169)

Estimated Marginal Means

GRP

Dependent Variable: SYN

GRP	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
0	23.744[a]	.893	21.965	25.523
1	25.028[a]	.981	23.074	26.983

a. Evaluated at covariates appeared in the model: TAASTOT = 179.72.

Grade 6: Ross Test Data Analysis

Univariate Analysis of Variance

Between-Subjects Factors

		N
GRP	0	43
	1	36

Descriptive Statistics

Dependent Variable: EVAL

GRP	Mean	Std. Deviation	N
0	18.93	4.06	43
1	22.19	3.82	36
Total	20.42	4.25	79

Grade 6: Ross Test Data Analysis

Tests of Between-Subjects Effects

Dependent Variable: EVAL

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	267.103[a]	2	133.552	8.871	.000
Intercept	13.388	1	13.388	.889	.349
TAASTOT	58.318	1	58.318	3.874	.053
GRP	122.110	1	122.110	8.111	.006
Error	1144.112	76	15.054		
Total	34345.000	79			
Corrected Total	1411.215	78			

a. R Squared = .189 (Adjusted R Squared = .168)

Estimated Marginal Means

GRP

Dependent Variable: EVAL

			95% Confidence Interval	
GRP	Mean	Std. Error	Lower Bound	Upper Bound
0	19.210[a]	.609	17.998	20.422
1	21.860[a]	.669	20.528	23.192

a. Evaluated at covariates appeared in the model: TAASTOT = 179.72.

Grade 5: CAQ Data Analysis

Oneway

Descriptives

IMP

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	41	2.5679	.4754	7.425E-02	2.4179	2.7180	1.29	3.43
1	41	2.7352	.4245	6.629E-02	2.6012	2.8692	1.71	3.43
Total	82	2.6516	.4557	5.032E-02	2.5514	2.7517	1.29	3.43

Test of Homogeneity of Variances

IMP

Levene Statistic	df1	df2	Sig.
1.126	1	80	.292

ANOVA

IMP

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.573	1	.573	2.824	.097
Within Groups	16.247	80	.203		
Total	16.820	81			

Grade 5: CAQ Data Analysis

Oneway

Descriptives

ENJ

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	41	2.6531	.2572	4.017E-02	2.5719	2.7343	2.22	3.11
1	41	2.6721	.2249	3.513E-02	2.6011	2.7431	2.00	3.11
Total	82	2.6626	.2403	2.654E-02	2.6098	2.7154	2.00	3.11

Test of Homogeneity of Variances

ENJ

Levene Statistic	df1	df2	Sig.
3.474	1	80	.066

ANOVA

ENJ

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.377E-03	1	7.377E-03	.126	.723
Within Groups	4.670	80	5.838E-02		
Total	4.678	81			

Grade 5: CAQ Data Analysis

Oneway

Descriptives

MOT

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound	Minimum	Maximum
0	41	2.2222	.3012	4.704E-02	2.1271	2.3173	1.56	3.00
1	41	2.3333	.3033	4.736E-02	2.2376	2.4291	1.67	2.89
Total	82	2.2778	.3055	3.374E-02	2.2106	2.3449	1.56	3.00

Test of Homogeneity of Variances

MOT

Levene Statistic	df1	df2	Sig.
.440	1	80	.509

ANOVA

MOT

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.253	1	.253	2.770	.100
Within Groups	7.309	80	9.136E-02		
Total	7.562	81			

Grade 5: CAQ Data Analysis

Oneway

Descriptives

STH

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	41	2.5878	.2629	4.105E-02	2.5048	2.6708	1.90	3.40
1	41	2.6488	.2873	4.487E-02	2.5581	2.7395	1.90	3.50
Total	82	2.6183	.2754	3.041E-02	2.5578	2.6788	1.90	3.50

Test of Homogeneity of Variances

STH

Levene Statistic	df1	df2	Sig.
.438	1	80	.510

ANOVA

STH

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.622E-02	1	7.622E-02	1.005	.319
Within Groups	6.066	80	7.583E-02		
Total	6.143	81			

Grade 5: CAQ Data Analysis

Oneway

Descriptives

EMP

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	41	2.8537	.4032	6.297E-02	2.7264	2.9809	2.00	3.70
1	41	2.9366	.3878	6.056E-02	2.8142	3.0590	2.20	3.70
Total	82	2.8951	.3953	4.365E-02	2.8083	2.9820	2.00	3.70

Test of Homogeneity of Variances

EMP

Levene Statistic	df1	df2	Sig.
.045	1	80	.832

ANOVA

EMP

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.141	1	.141	.901	.345
Within Groups	12.517	80	.156		
Total	12.658	81			

Grade 5: CAQ Data Analysis

Oneway

Descriptives

CRE

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	41	3.0882	.5187	8.102E-02	2.9244	3.2519	1.77	4.00
1	41	3.3002	.3680	5.748E-02	3.1840	3.4164	2.23	4.00
Total	82	3.1942	.4595	5.074E-02	3.0932	3.2951	1.77	4.00

Test of Homogeneity of Variances

CRE

Levene Statistic	df1	df2	Sig.
4.127	1	80	.046

ANOVA

CRE

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.921	1	.921	4.555	.036
Within Groups	16.182	80	.202		
Total	17.103	81			

Grade 5: CAQ Data Analysis

Oneway

Descriptives

ANX

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound	Minimum	Maximum
0	41	2.0122	.3706	5.788E-02	1.8952	2.1292	1.38	2.75
1	41	1.9543	.3500	5.465E-02	1.8438	2.0647	1.38	2.63
Total	82	1.9832	.3594	3.969E-02	1.9043	2.0622	1.38	2.75

Test of Homogeneity of Variances

ANX

Levene Statistic	df1	df2	Sig.
.296	1	80	.588

ANOVA

ANX

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.879E-02	1	6.879E-02	.530	.469
Within Groups	10.393	80	.130		
Total	10.461	81			

Grade 5: CAQ Data Analysis

Oneway

Descriptives

SEC

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	41	2.4916	.2407	3.760E-02	2.4156	2.5675	2.00	3.08
1	41	2.5253	.2383	3.721E-02	2.4501	2.6005	2.08	3.08
Total	82	2.5084	.2386	2.635E-02	2.4560	2.5609	2.00	3.08

Test of Homogeneity of Variances

SEC

Levene Statistic	df1	df2	Sig.
.007	1	80	.933

ANOVA

SEC

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.338E-02	1	2.338E-02	.408	.525
Within Groups	4.589	80	5.736E-02		
Total	4.612	81			

Grade 6: CAQ Data Analysis

Oneway

Descriptives

IMP

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	58	2.7562	.4032	5.294E-02	2.6501	2.8622	1.43	3.43
1	32	2.8750	.3513	6.211E-02	2.7483	3.0017	2.29	3.43
Total	90	2.7984	.3878	4.088E-02	2.7172	2.8796	1.43	3.43

Test of Homogeneity of Variances

IMP

Levene Statistic	df1	df2	Sig.
.232	1	88	.631

ANOVA

IMP

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.291	1	.291	1.958	.165
Within Groups	13.092	88	.149		
Total	13.383	89			

Grade 6: CAQ Data Analysis

Oneway

Descriptives

ENJ

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound	Minimum	Maximum
0	58	2.7069	.2200	2.888E-02	2.6491	2.7647	2.22	3.44
1	32	2.7708	.2257	3.989E-02	2.6895	2.8522	2.33	3.44
Total	90	2.7296	.2229	2.349E-02	2.6829	2.7763	2.22	3.44

Test of Homogeneity of Variances

ENJ

Levene Statistic	df1	df2	Sig.
.003	1	88	.960

ANOVA

ENJ

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.430E-02	1	8.430E-02	1.711	.194
Within Groups	4.337	88	4.928E-02		
Total	4.421	89			

Grade 6: CAQ Data Analysis

Oneway

Descriptives

MOT

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	58	2.1743	.2778	3.647E-02	2.1013	2.2474	1.56	2.56
1	32	2.2118	.2417	4.273E-02	2.1247	2.2990	1.67	2.78
Total	90	2.1877	.2647	2.791E-02	2.1322	2.2431	1.56	2.78

Test of Homogeneity of Variances

MOT

Levene Statistic	df1	df2	Sig.
.844	1	88	.361

ANOVA

MOT

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.896E-02	1	2.896E-02	.410	.523
Within Groups	6.209	88	7.056E-02		
Total	6.238	89			

Grade 6: CAQ Data Analysis

Oneway

Descriptives

STH

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	58	2.4534	.2556	3.356E-02	2.3862	2.5207	1.70	2.90
1	32	2.4844	.2371	4.191E-02	2.3989	2.5698	2.00	2.90
Total	90	2.4644	.2483	2.617E-02	2.4124	2.5164	1.70	2.90

Test of Homogeneity of Variances

STH

Levene Statistic	df1	df2	Sig.
.038	1	88	.845

ANOVA

STH

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.972E-02	1	1.972E-02	.318	.575
Within Groups	5.466	88	6.212E-02		
Total	5.486	89			

Grade 6: CAQ Data Analysis

Oneway

Descriptives

ANX

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	58	2.0905	.4373	5.742E-02	1.9755	2.2055	1.50	4.25
1	32	1.9453	.3283	5.804E-02	1.8269	2.0637	1.50	2.75
Total	90	2.0389	.4061	4.280E-02	1.9538	2.1239	1.50	4.25

Test of Homogeneity of Variances

ANX

Levene Statistic	df1	df2	Sig.
.375	1	88	.542

ANOVA

ANX

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.435	1	.435	2.687	.105
Within Groups	14.242	88	.162		
Total	14.676	89			

Grade 6: CAQ Data Analysis

Oneway

Descriptives

EMP

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	58	2.8828	.5086	6.678E-02	2.7490	3.0165	2.00	5.50
1	32	2.8531	.3910	6.912E-02	2.7121	2.9941	1.80	3.60
Total	90	2.8722	.4681	4.934E-02	2.7742	2.9703	1.80	5.50

Test of Homogeneity of Variances

EMP

Levene Statistic	df1	df2	Sig.
.786	1	88	.378

ANOVA

EMP

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.811E-02	1	1.811E-02	.082	.776
Within Groups	19.482	88	.221		
Total	19.501	89			

Grade 6: CAQ Data Analysis

Oneway

Descriptives

SEC

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	58	2.4814	.2636	3.461E-02	2.4121	2.5507	2.00	3.62
1	32	2.4447	.2367	4.184E-02	2.3594	2.5300	1.92	2.92
Total	90	2.4684	.2536	2.673E-02	2.4153	2.5215	1.92	3.62

Test of Homogeneity of Variances

SEC

Levene Statistic	df1	df2	Sig.
.000	1	88	.984

ANOVA

SEC

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.781E-02	1	2.781E-02	.430	.514
Within Groups	5.696	88	6.472E-02		
Total	5.724	89			

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