

ENTRANCE EXAM CORRELATIONS INDICATING POTENTIAL
NORTHCENTRAL TECHNICAL COLLEGE
MECHANICAL DESIGN TECHNICIAN PROGRAM
COMPLETERS AND NON-COMPLETERS

by

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ABSTRACT

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The purpose of this study is to identify if a correlation exists between the results of Northcentral Technical College's entrance exams, the Accuplacer and the DAT, and the potential for Mechanical Design Technician students to be completers or non-completers of the program. Archival data from 30 randomly selected Mechanical Design Technician program completers and 30 randomly selected program non-completers was retrieved and plotted on scatter diagrams to identify trends apparent in percentile test scores of this population. Predictability of success in the Mechanical Design Technician program, based on student percentile scores, was compared to predictability reported by Accuplacer and DAT validity studies.

It was determined that of the six areas tested; Reading, Sentence Skills, Mechanical Aptitude, Spatial Relations Aptitude, Arithmetic, and Elementary Algebra, student percentile scores in Arithmetic and Elementary Algebra showed a higher percentage of predictability of success in the Mechanical Design Technician program than Reading, Sentence Skills, Mechanical Aptitude, or Spatial Relations Aptitude testing percentiles. This study also showed Arithmetic and Elementary Algebra testing score predictability of success to be consistent with Accuplacer's validity reporting.

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CHAPTER I: INTRODUCTION

Background

Most colleges throughout the United States require some type of entrance exam or proof of a specific level of knowledge and ability before accepting a person into academia (*College entrance exams*, 2001). Some of the more common forms of entrance exam tests are the SAT and ACT (*ESC issue site*, 2002). Northcentral Technical College (NTC) in Wausau, WI is not dissimilar. NTC requires that anyone applying for entrance into an associate degree program at the college show proof of level of knowledge or ability with ACT or SAT results, grade transcripts from another postsecondary school, or the completion of the Accuplacer and Differential Aptitude Test (DAT) (J. Hansen, personal communication, June 17, 2002). Approximately 85% of students applying for entry into a two-year associate degree program at NTC demonstrate their level of knowledge or skill with results from the Accuplacer and the DAT (N. Gould, personal communication, June 17, 2002). These two tests are administered at NTC (W. Owens, personal communication, June 13, 2002).

Each associate degree program at NTC recommends a varying level of knowledge or skill in specific areas such as English, Mathematics, Science, mechanical aptitude, and spatial relations aptitude (*Minimum admission requirements for entry*, personal communication, September 19, 2001). The Mechanical Design Technician associate degree program recommends minimum Accuplacer scores of 60th percentile in Reading Comprehension, 50th percentile in Sentence Skills, 70th percentile in Arithmetic, 70th percentile in Elementary Algebra, and minimum DAT scores of 60th percentile for both spatial and mechanical aptitudes (*MDT program admission guidelines*, personal

communication, September 19, 2001). These Mechanical Design Technician minimum test scores were determined by the NTC guidance/career counselors and the Mechanical Design instructors in 1992, and were based on best professional estimates (N. Gould, personal communication, June 17, 2002). Students not meeting these minimum recommendations are directed to the GOAL lab for remedial skills training, or counseled into another occupational area of study (*Minimum admission requirements for entry*, personal communication, September 19, 2001). Once a specific level of remediation is achieved, students are allowed to retake the Accuplacer and DAT to demonstrate that the recommended knowledge and skill level exists for program entry (*Learning center (GOAL) referral form*, personal communication, 2002). Because retesting is not required, upon completion of remediation some students will also be admitted into the Mechanical Design Technician program under the advisement of GOAL lab instructors, without retaking the Accuplacer and DAT to verify knowledge and skill level (W. Owens, personal communication, March 2, 2004).

Entrance exam test score results, which include the Accuplacer and DAT, have historically been used as an indicator of success when completing a specific course of study (Hawks & Lindquist, 1999). Therefore, it could be assumed that students with test results allowing entrance into the Mechanical Design Technician program at NTC would be successful completers of the program. But, over the past five years, less than 40% of the students entering the program have completed the course of study required for graduation (*Program comparison*, personal communication, June 17, 2002). There is a need to review the results of the Accuplacer and DAT exams and determine if there are notable correlations in the test results of program completers and non-completers

(K. Barr, personal communication, March, 2002). If correlations can be found, this information could serve as future projects to: increase the number of students allowed into the program, to increase FTE's which would allow for additional program funding, and to increase the number of students who complete the program and are available to fill job opening throughout the NTC district.

Statement of the Problem

Northcentral Technical College needs to determine if a correlation exists between the Accuplacer and the DAT entrance exam results and the potential for a Mechanical Design Technician (MDT) student to be a completer or a non-completer, through the analysis of archival data collected from 1998 through 2004. There has never been a formal entrance exam study conducted at Northcentral Technical College that is specific to the MDT associate degree program (N. Gould, personal communication, June 17, 2002).

Purpose of the Study

The purpose of this study is to identify if a correlation exists between the results of Northcentral Technical College's entrance exams, the Accuplacer and the DAT, and the potential for a MDT student to be a completer or a non-completer.

Research Objectives

This study will address the following objectives:

- 1) Determine if there is a correlation in the entrance exam test results of past Northcentral Technical College MDT program non-completers.
- 2) Determine if there is a correlation in the entrance exam test results of past Northcentral Technical College MDT program completers.

- 3) Compare the test results of completers and non-completers.

Justification for Research

A study to identify correlations in the entrance exams of Northcentral Technical College MDT students can be justified on several levels:

- 1) Test result correlations of non-completers may assist in identifying potential MDT students who require remedial instruction in specific areas before entering Northcentral Technical College's MDT program. This remedial instruction could better prepare students for successful completion of the program.
- 2) Correlations identifying a future MDT student as possibly a completer or non-completer can be used by guidance counselors to encourage or direct students into a workforce education program that better matches their abilities.
- 3) Test result correlations in specific test areas may indicate that to complete the MDT program, potential new students may have lower test results in specific areas than those that were historically used, allowing a greater number of students into the MDT program.
- 4) This study can be used by other Northcentral Technical College programs as a model to identify the entrance exam test result correlations of completers and non-completers.
- 5) This study could be used by high schools in the Northcentral Technical College district for curriculum planning to prepare students for the MDT program.
- 6) This study may be used by other Technical Colleges in Wisconsin as a model to identify the entrance exam correlations of completers and non-completers.

Significance of the Study

This study is important to the MDT program at Northcentral Technical College for the following reasons:

- 1) This study reinforces the use of entrance exam testing for potential Northcentral Technical College MDT students.
- 2) This study may identify a need for changing the test result recommendations currently in place for Northcentral Technical College's MDT program.
- 3) This study may assist in increasing the number of Northcentral Technical College MDT graduates, if test result correlations are used to assist in the academic preparation of entering students.
- 4) Community support of the MDT program will increase as a greater number of graduates are produced to fill the needs of Northcentral Technical College district businesses and industries.

Limitations of the Study

There are limitations associated with this research:

- 1) Not all potential students take the Accuplacer and DAT before being accepted into Northcentral Technical College's MDT program.
- 2) Northcentral Technical College does not archive Accuplacer and DAT testing data for more than five years.
- 3) The study will not include a plan for revising the Accuplacer and DAT results levels recommended for admission into NTC's MDT program.

Assumptions of the Study

The following assumptions are present in this research:

- 1) This study assumes Accuplacer and DAT results are a valid indicator of readiness and abilities necessary to complete the MDT program.
- 2) This study assumes that archival data retrieval will be accurate and complete.
- 3) This study assumes that completion or non-completion of the program is determined by academic and cognitive abilities.
- 4) This study assumes financial and personal situations do not play an active role in completion or non-completion of the MDT program at Northcentral Technical College.

Definition of Terms

For clarity of understanding, the following terms used within this study were defined:

Accuplacer – A computerized assessment test that will provide information about level of skill accomplishment in reading, writing and one of three levels of mathematics (*Placement test, 2002*). Community colleges, four-year colleges, and technical schools around the world extensively use this test (*The college board, 2002*).

American College Testing (ACT) – A college entrance exam measuring achievement in the core curriculum areas and is based on academic knowledge and skills typically taught in high school college-preparatory courses (*ESC issue site, 2002*).

Completer – Person who has started a program course of study and completes all requirements for graduation.

Differential Aptitude Test (DAT) - An assessment test used to measure academic aptitude and reasoning ability such as mechanical and spatial relations (*Differential aptitude test*, 2000).

Full-Time Equivalent (FTE) – Unit of measure used in the Wisconsin Technical College system to determine the effectiveness of educational programs. One FTE equals 30 student credit hours. The greater the FTE numbers, the greater the state financial aid the program receives. One FTE generates approximately \$2,000.00 in state aid (J. Worden, personal communication, June 17, 2002).

GOAL Lab – Learning center at NTC designed to provide self-paced, individualized classes for the purpose of improving academic skills in preparation for a specific course of study (*NTC student catalog*, 2003).

Mechanical Design Technician (MDT) – A title used in industry for those who have typically complete a two-year associate degree program with an engineering emphasis from a Technical College, University Extension, or Community College (Bureau of Labor Statistics, 2002).

Non-completer – Person who has started a program course of study and does not complete all requirements for graduation.

Percentile – A number dividing the range of a set of test data based on comparisons to other students completing similar test questions (*The college board, computerized placement tests*, personal communication, October, 1991).

Scholastic Aptitude Test (SAT) - A college entrance exam designed to measure aptitude and innate intelligence (*ESC issue site, 2002*).

Spatial Relations Aptitude – The ability to visualize a three-dimensional object from a two-dimensional pattern, and to also visualize how the object would look if rotated in space (*Differential aptitude test, 2000*).

Workforce Education – Educational curriculum designed to prepare learners for occupations in business and industry (*Gray, 1998*).

Methodology

This chapter outlined the need, purpose, justification, and significance for conducting a study to identify whether a correlation exists between the results of entrance exams given to potential Northcentral Technical College Mechanical Design Technician students and their potential to be completers or non-completers of the program. The study's assumptions and limitations were clarified and terminology was defined.

The succeeding Chapter II will be a review of literature. Chapter III contains a discussion of the methods and procedures applied in this study, which include a review of past entrance exams and a checklist that will be used to compile archival data from Northcentral Technical College Mechanical Design Technician program completers and non-completers. The results of the study are presented in Chapter IV. The final chapter, Chapter V, provides a summary, conclusions, and recommendations for further study.

CHAPTER II: REVIEW OF LITERATURE

Introduction

This review will explore the reliability of the Accuplacer and DAT as predictors of success within two-year college programs, as well as detailing the skill levels associated with Accuplacer and DAT scoring. Background information regarding the use of the Accuplacer and DAT at Northcentral Technical College will be reviewed, including minimum percentile recommendations for admission into the MDT program at Northcentral Technical College.

Accuplacer Entrance Exam

The Accuplacer was developed, standardized, and validated by the College Board and is used to identify students' strengths and needs in a variety of subjects including the areas of reading, sentence skills, arithmetic, and elementary algebra. Northcentral Technical College has been using the Accuplacer as one of their entrance exams since 1992. Currently the Accuplacer is used at more than 300 colleges nationwide (*Accuplacer placement testing student guide*, 2002).

In research conducted to test the validity of the Accuplacer, two-year colleges across the country administered the test and then compared the test results and a predicted grade of "C" or better, with a student's actual grade earned after taking a course requiring a specific skill level associated with that subject matter. An overall 69% of those who had taken the test were correctly identified regarding whether they would earn a grade above or below a "C." This observation rate between the predicted and actual grade outcome was considered a highly significant finding (*Accuplacer notebook*, 1993).

Each subject area of Accuplacer testing, reading, sentence skills, arithmetic, and elementary algebra, demonstrates varying skill levels specific to that subject. Students scoring the percentile shown demonstrate the following skills in reading comprehension. Between the 15th and 49th percentile, students will comprehend short passages characterized by uncomplicated ideas, straightforward presentation, general proximity of subject matter to everyday experience, they will recognize main and less central ideas and the tone of passages when questions do not require fine distinction. Between the 50th and 84th percentile, students are able to read with comprehension short passages that are characterized by moderately uncomplicated ideas and organization, and moderately sophisticated vocabulary. They will recognize main and secondary points making somewhat fine distinctions, making simple deductions for a series of facts, and be able to recognize organizing principles, including the relationship between sentences. Those scoring in the 85th percentile or higher will read with comprehension short passages that are somewhat complex in terms of one or more of the following traits: ideas conveyed, likely unfamiliarity with the subject matter, difficulty of the vocabulary used, and difficulty of sentence structure. They will also identify points that are merely implied, follow moderately complex arguments or speculations, and recognize subtle tone and organization.

Sentence Skills are demonstrated with the following percentiles: 15th to 49th percentile includes the ability to solve simple problems in sentence inversion, subordination, and logic, correct simple sentence fragments, and correct misplaced modifiers. At this level sentence stimuli are about 15 to 20 words in length. Skill levels in the 50th to 84th percentile include the ability to solve problems of faulty coordination in a

sentence with one or two clauses, faulty subordination in a sentence with one or two clauses, manipulate verb clauses and active and passive voices, and solve problems that combine logic and grammar. Sentence length at this level is about 28 words. A sentence skill level of 85th percentile or higher demonstrates the ability to manipulate complex sentences having two or more subordinate clauses and/or inclusions, correct problems of syntax error and repetitive diction, and recognize correct and incorrect linkages of clauses, including problems involving semicolons. Maximum sentence length is about 31 words.

Arithmetic skill demonstrated between the 20th to 49th percentiles represents the ability to perform simple addition, subtraction, and multiplication operations with decimals. At this level students can also determine the relative size of fractions, calculate averages, and solve simple word problems involving money. Students scoring in the 50th to 79th percentile range demonstrate skill in performing basic addition, subtraction, multiplication, and division of whole numbers, fractions and decimals, and mixed number arithmetic operations. They can also make simple conversions among fractions, decimals, and percents, and can estimate products of decimals and square roots of whole numbers. Those scoring in the 80th to 94th percentile range can divide whole numbers by decimals or fractions and solve simple word problems involving fractions, decimals, ratios, percent increase and decrease, and perimeter. Arithmetic percentile scores of 95 and above is a demonstration of skill in solving word problems involving manipulation of units of measure, solving more complex problems involving percent, averaging, and proportional reasoning, finding the square root of mixed numbers and decimal numbers, and solving simple number sentences involving a variable.

Students scoring between the 20th to 49th percentiles in Elementary Algebra demonstrate a sense of order relationships and the relative size of signed numbers. If a 50th to 79th percentile score is achieved students can perform operations with signed numbers and algebraic expressions combining terms, multiplying binomials, and identifying common factors. A 80th to 94th Elementary Algebra percentile score demonstrates skill in simplified algebraic expressions, adding radicals, adding algebraic fractions, factoring quadratic expressions in standard form, factoring the difference of squares, squaring binomials, evaluating algebraic expressions, and solving linear equations with integer coefficients. Students scoring 95th percentile and higher demonstrate skill in factoring quadratic expressions, solving quadratic equations in nonstandard form, solving linear equations with fractional and literal coefficients, solving linear inequalities with integer coefficients, solving systems of equations, and identifying graphical properties of equations and inequalities (*Accuplacer notebook*, 1993).

It is recommended by the developers of the Accuplacer that instructors, guidance counselors, and test administrators review the skill level associated with the percentile scores of each subject area and set minimum entrance exam test scores according to the skill level required for acceptance into a specific program of study. Test scores are an indicator of current skill level and a predictor of an individual's ability to succeed in a course requiring those skills. Those students not meeting the minimum skill level requirements should seek remediation to develop the required skills (*Accuplacer notebook*, 1993).

DAT Entrance Exam

The DAT was first published in 1947 and is most commonly used by secondary schools and two-year technical colleges. In 1982 a third revision was made to the test battery. This third revision is forms V and W. There have been two more recent revisions made to the test. The most recent revision was published in 1990, DAT Level 1 and Level 2 – Form C, although forms V and W continue to be used nation wide (R. Smith, personal communication, February 8, 2004). NTC currently uses the V and W forms of the DAT. V and W are alternate forms of the same test. The more recent revisions of the DAT do not have alternate forms. NTC saw the ability to have alternate forms as an advantage over the more recent revisions because the test is sometimes given to large groups sitting in close proximity to each other, and sometimes circumstances are presented in which students retake the tests (W. Owens, personal communication, February 10, 2004).

The authors and publishers of the DAT have conducted a series of validity studies on the V and W forms of the DAT. These studies have yielded thousands of validity coefficients. The accepted method of determining the predictive value of the DAT is first to administer it to an adequate number of persons who are about to begin a particular type of educational course. When sufficient time has elapsed so that success in the course can be reasonably assessed, a criterion measure is obtained. The criterion measure reflects how well an individual performs on his/her educational tasks. The most common means of expressing the relationship between the DAT and a criterion is the validity coefficient of correlation between test scores and criterion measures. The magnitude of the validity coefficients reported strongly suggests that the DAT is a very good predictor of educational outcomes (Bennett, Seashore, & Wesman, 1984).

Unlike many entrance exams, the DAT does not measure an individual's level of knowledge. Instead, the DAT is a series of assessments designed to measure an individual's ability to learn or to succeed in a variety of areas. Two of these areas of assessment are mechanical reasoning and spatial relations. Mechanical reasoning measures the mechanical principles of motion, tools, and machinery. Pictorially presented mechanical situations and simply worded questions are used to represent principles that involve reasoning rather than specific knowledge. Test scores may predict success as a carpenter, electrician, engineer, machine operator, or any job where repair and operation of complex devices is involved. Spatial relations testing measures an individual's ability to visualize a three-dimensional object from a two-dimensional pattern, as well as one's ability to visualize how the object would look if rotated in space. Test scores may predict success in architecture, art, carpentry, clothing design, and drafting (*Differential aptitude test*, 2002).

The DAT allows a maximum possible raw score of 70 in mechanical reasoning and 60 in spatial relations. Student scores are reported by percentile. This percentile rank compares the individual's raw score with the raw scores of other students nationwide who have taken the test. A percentile score of 80 means the student is at the top of 80% of those tested (*DAT scoring assistant*, 2004). A setting of test scores at the 35th, 55th, and 80th percentile makes it possible to deal with four ability groups, the below average (below 35th percentile), low average (35th to below 55th percentiles), high average (55th to below 80th percentile) and superior (80th percentile and above). Predictability of success is described in like terms, where in an individual scoring below average in mechanical reasoning would have a below average likelihood of being successful in a course of study

utilizing mechanical reasoning aptitude such as Engineering and Applied Science (Bennett, Seashore, & Wesman, 1982).

Use of the Accuplacer and DAT at Northcentral Technical College

NTC has always used an assessment instrument to measure student readiness for the MDT program. But, NTC does not use assessment results as a barrier for admission into the MDT program. In 1992 NTC became one of the first two-year colleges in Wisconsin to begin using the Accuplacer. The Accuplacer is now a commonly used assessment tool throughout the Wisconsin Technical College System. The DAT has been used by NTC for more than 30 years. Although the DAT is not widely used within the Wisconsin Technical College System, NTC has found a good history of validity and reliability with the test (J. Hansen, personal communication, January 27, 2004).

Currently NTC recommends the following minimum scores for admission into the Mechanical Design Technician program:

Accuplacer - 60th percentile in Reading Comprehension

50th percentile in Sentence Skills

70th percentile in Arithmetic

70th percentile Elementary Algebra

DAT - 60th percentile in spatial aptitude

60th percentile in mechanical aptitude

(*MDT program admission guidelines*, personal communication, September 19, 2001).

Of the students admitted into the MTD program, 85% take the Accuplacer and DAT, yet less than 40% of those students admitted into the program are completers of the program.

CHAPTER III: METHODOLOGY

Introduction

This chapter will describe the research site, procedures, as well as the subjects under study. In addition, the instrument used to collect information will be discussed as to its content, format, validity, and reliability. The chapter will conclude with some of the methodological limitations.

Site Selection

The site selected for research was Northcentral Technical College, which is part of the Wisconsin Technical College system (WTC), located in Wausau, Wisconsin. NTC serves all or part of ten counties in north central Wisconsin. The college currently has approximately 2,450 full-time equivalent (FTE) students, and nearly 18,000 people take at least one class annually (*NTC student catalog*, 2003). NTC offers certificate programs, one-year diploma programs, and two-year associate degree programs, as well as the opportunity to enroll in general studies classes and specific interest courses. Mechanical Design Technician is one of the two-year associate degree programs offered at NTC.

Description of Subjects

The sample for this study was drawn from those students who had enrolled in Northcentral Technical College's MDT program from 1998 through 2002 and had also taken the Accuplacer and the DAT entrance exams.

Sample Selection

A list of students was generated by ID number who took the Accuplacer and/or the DAT and also enrolled in the MDT program. Students were not identified by name, only by ID number. ID numbers cannot be linked back to the student's name. Student's

names and ID numbers are not used in this paper. From this list, two groups have been identified: MDT completers and MDT non-completers. A minimum of 30 students were randomly selected from each group to be part of the study, for a total sample of 60 students.

Instrument

The instrument used to list archival data was a sheet (Appendix) consisting of four column groups. The first column listed individuals by student ID number who had enrolled in the MDT program at NTC. The second column identified whether the individual completed the Accuplacer and/or DAT. The third column identified whether the student completed NTC's requirements for graduation from the MDT program. The fourth column lists the raw test score students received on the Accuplacer and the DAT, in six areas; reading, sentence skills, arithmetic, elementary algebra, mechanical aptitude, and spatial relations. This fourth column also lists the percentile conversion of the raw score. The researcher developed the data collection sheet.

Data Collection

Archival data was retrieved and listed on the data collection sheet by the researcher, the testing department, and the student services department at NTC. Student services provided the researcher with class rosters for MDT program first semester classes from 1998 through 2002. From these rosters the researcher pulled student ID numbers of students who had enrolled in the first semester classes for the MDT program. The researcher listed the student ID numbers in column A on the data collection sheet. Student services also provided a listing of MDT graduates from 2000 through 2004. Using the graduation list the researcher identified completer and non-completers of the

MDT program and listed them on the data collection sheet in column C. The researcher and the testing department searched data bases for archival information indicating whether each student listed in column A completed the Accuplacer and/or the DAT. This information was indicated in column B. The testing department and the researcher retrieved each student's raw test scores and corresponding percentile scores for reading, sentence skills, arithmetic, elementary algebra, mechanical aptitude, and spatial relations from the Accuplacer and DAT testing data bases. These raw test scores and corresponding percentile scores were listed on the data collection sheet in column D. Test scores not available in testing data bases were retrieved by the researcher and testing department by searching paper files available in the testing lab.

Data Analysis

Data was presented on six scatter diagrams: completers and non-completer – reading, completers and non-completer – sentence skills, completers and non-completer – arithmetic, completers and non-completer – elementary algebra, completers and non-completer – mechanical aptitude, completers and non-completer – spatial relations. Percentile scores for the Accuplacer and DAT are presented on each diagram. Each diagram identifies percentile scores on the horizontal axis. A bold vertical line identifies the percentile score recommended for admission into the MDT program at NTC. Each randomly selected MDT program completers' percentile scores are represented by numbers 1 through 30 on the vertical axis. Completers' percentile scores are plotted with an X. Each randomly selected MDT program non-completers' percentile scores are represented by numbers 31 through 60 on the vertical axis. Non-completer's percentile scores are plotted with an O.

Percentile test scores were compared for completer and non-completer in each of the test areas; reading, sentence skills, arithmetic, elementary algebra, mechanical aptitude, and spatial relations to determine if there is a correlation between the percentile scores of completers vs. non-completers.

Limitations

It is unknown whether students were non-completers due to academic reasons or if they do not complete the program for other reasons.

Archival testing data for the Accuplacer and the DAT is only stored by Northcentral Technical College for five years. Therefore, no information from more than five years ago is available.

Not all students complete the MDT program at NTC in less than five years. Students may be categorized as non-completers, but may return at a much later date to complete the program.

Test scores could be lower than a student's actual skill level due to anxiety caused by test taking. Or, if students are not comfortable using computers, test scores could be lower due to the test being administered via computer. Because test scores reflect student's skills at the time they take the test, scores could be lower if the students are "non-traditional" in the sense that they have been away from school for a while.

Archival data may have been recorded incorrectly into the testing data bases and incorrect data may have been retrieved by the researcher, student services personnel, and the testing department.

CHAPTER IV: RESULTS

Introduction

The results of this study includes demographic information about the research subjects and the Accuplacer and DAT percentile test scores findings for these subjects is presented on six scatter diagrams. Research findings are reviewed comparing the percentage of completers vs. non-completers of the MDT program based on Accuplacer and DAT percentile test scores.

Demographic Information

The sample group for this study was students who had enrolled in the first semester courses for Northcentral Technical College's MDT program from 1998 through 2002 and had also taken the Accuplacer and the DAT entrance exams. These students were placed in two groups, completers and non-completers of the MDT program based on whether they had met all the requirements for gradation from the MDT program. Randomly a sample of 30 students was selected from each group, for a total population of 60.

Presentation and Review of Findings

The six scatter diagrams are used to show Accuplacer and DAT percentile test scores presenting on the vertical axis completers numbered 1 through 30 and non-completers numbered 31 through 60. Percentile scores are presented on the horizontal axis with the recommended percentile for admission into the MDT program shown with a bold vertical line. Completers' percentile scores are plotted with an X. Non-completer's percentile scores are plotted with an O.

Accuplacer percentile test scores for Reading are presented in Diagram 1, page 24. The average Reading percentile score for completers was 56 and for non-completers was 48, a difference of 8 percentile points. 36.5% of completers scored equal to or higher than the 60th percentile recommended for admission into the MDT program, while 23.5% of the non-completers scored equal to or higher than the 60th percentile recommended.

Diagram 2, page 25, presents Accuplacer percentile test scores for Sentence Skills. The average Sentence Skills percentile score for completers was 51 and for non-completers was 48, a difference of 3 percentile points. MDT program completers scoring equal to or higher than the 50th percentile recommended for admission was 50%, while the percent of MDT program non-completers scoring equal to or higher than the 50th percentile recommended was 43.5%.

Accuplacer Arithmetic percentile test scores are presented in Diagram 3, page 26. MDT program completers scored an average of 85th percentile in Arithmetic. MDT program non-completers scored an average of 67th percentile in Arithmetic, a difference of 19 percentile points. 86.5% of those students completing the MDT program scored equal to or greater than the recommended 70th percentile for program admission, while 33.5 % of the students who did not complete the MTD program scored equal to or greater than the recommended 70th percentile for program admission.

Diagram 4, page 27, presents Accuplacer Elementary Algebra percentile test scores. The average percentile scores for MDT program completers was 76 and for non-completers was 60, equaling a difference of 16 percentile points. 73.5% of program completers scored equal to or higher than the recommended 70th percentile for admission

into the MDT program and 36.5% of those students not completing the program scored equal to or higher than the recommended 70th percentile for program admission.

Mechanical Aptitude DAT percentile test scores are presented in Diagram 5, page 28. Completers scored an average 81st percentile while non-completers scored an average 72nd percentile, equaling a separation of 9 percentile points. NTC recommends a minimum Mechanical Aptitude test score of 60th percentile for admission into the MDT program. 93.5% of those students completing the MDT program scored greater than or equal to 60th percentile on the DAT. 83.5% of the students who did not complete the MDT program scored greater than or equal to the recommended 60th percentile.

MDT student DAT percentile test scores for Spatial Aptitude are shown in Diagram 6, page 29. The average Spatial Aptitude percentile score for completers was 82 and for non-completers 74, a difference of 8 percentile points. MDT program completers scoring equal to or higher than the 60th percentile recommended for admission was 90%, while the percent of MDT program non-completers scored equal to or higher than the 60th percentile recommended was 73.5%.

Compiling the results of all six test areas shows that 71.5% of completers of the MDT program scored equal to or higher than the currently recommended test score minimum for entrance into the MDT program at NTC. Compiling the results of all six test areas for non-completers shows that 49% scored equal to or higher than the currently recommended test score minimum for entrance into the MDT program at NTC.

While the average percentile test score for each of the six test areas was higher for the completer group than the non-completer group the most notable test score trend was in the area of mathematics. Archival data reports that 24% of students scoring below the

current percentile minimum recommended for entry into the MDT program in Arithmetic and Elementary Algebra historically have completed the MDT program at NTC, compared to a those scoring equal to or greater than the current minimum percentile having a 70% history of completion.

Diagram 1: Accuplacer percentile scores - Reading.

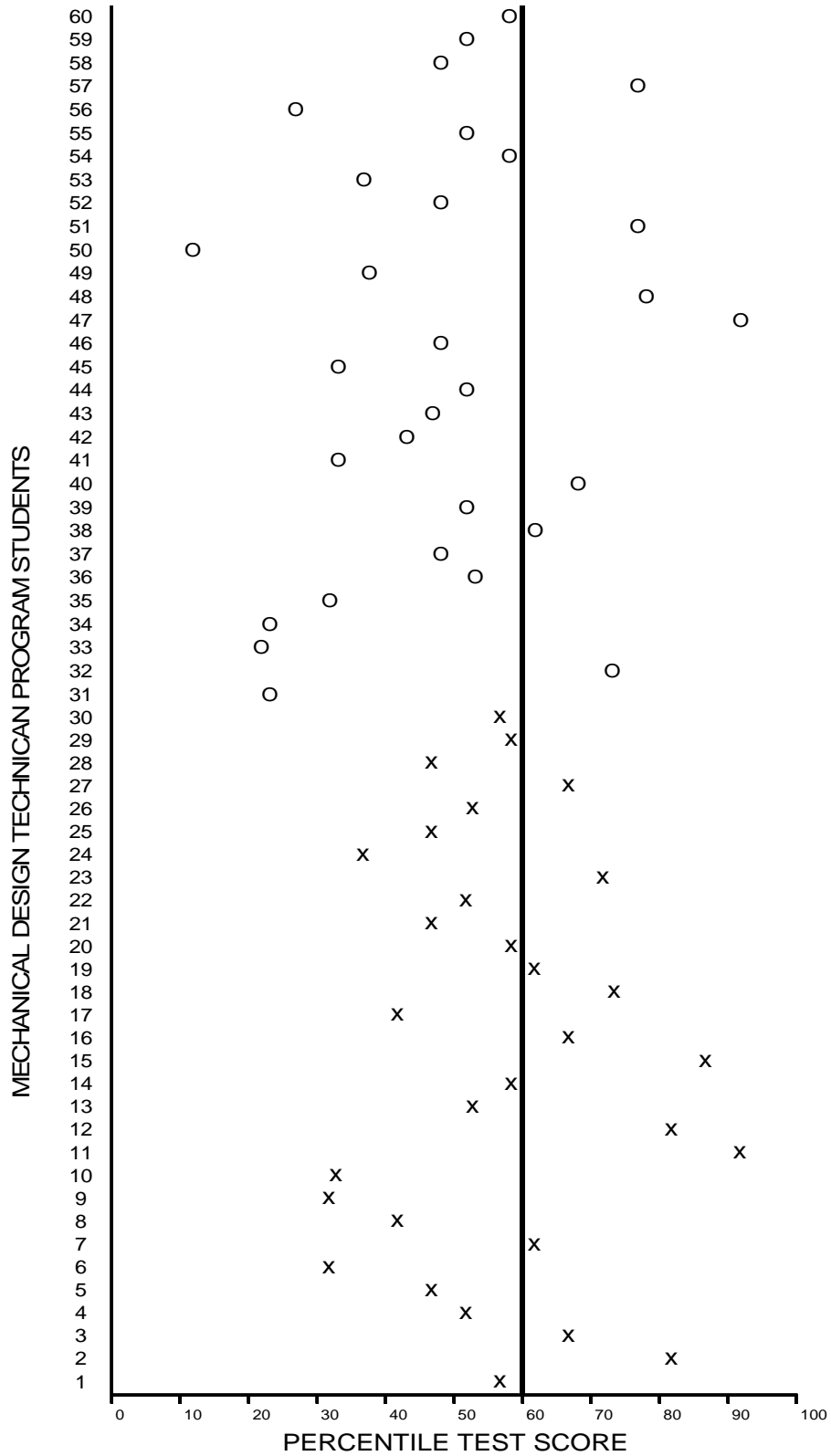


Diagram 2: Accuplacer percentile scores - Sentence Skills.

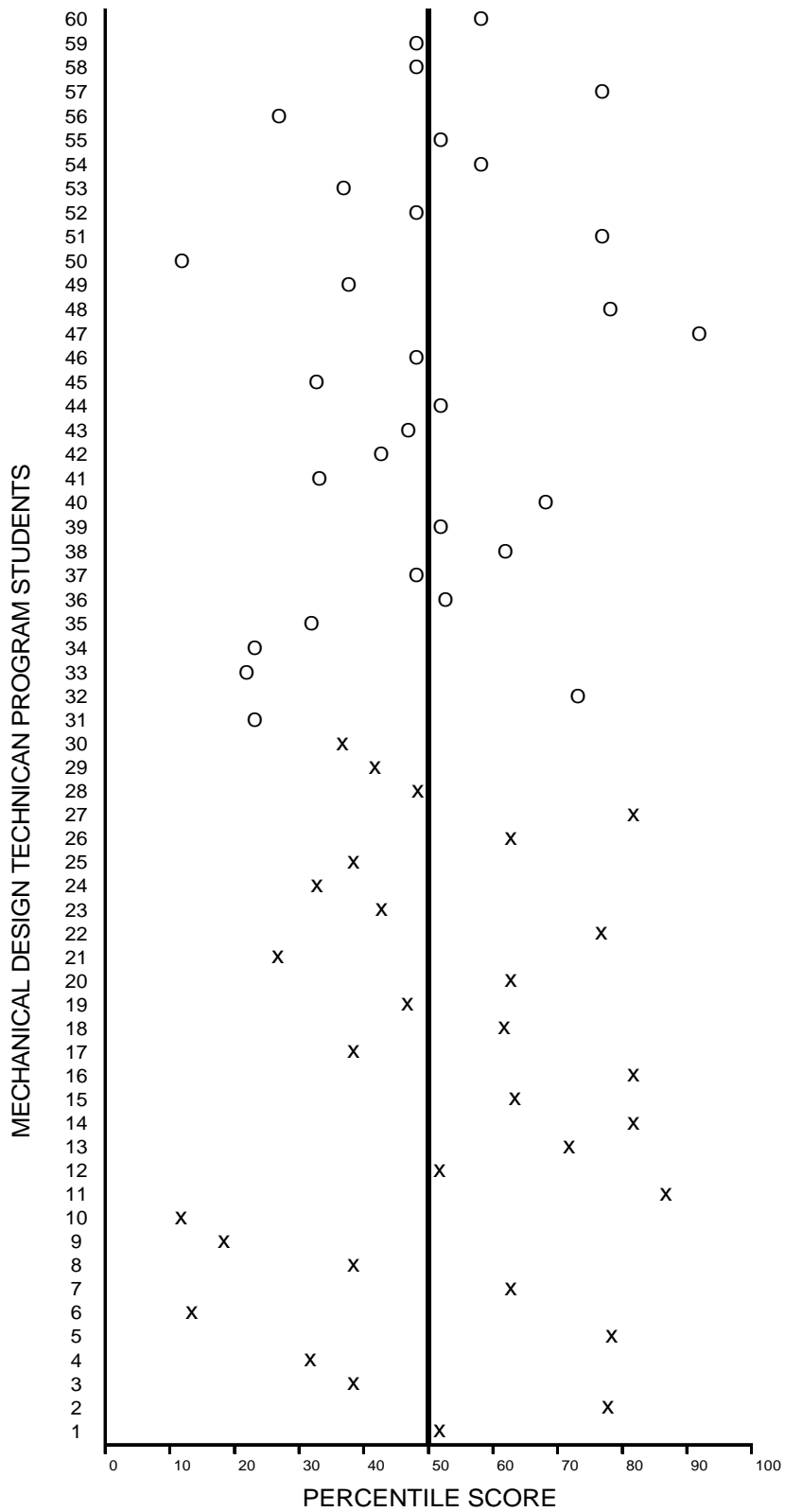


Diagram 3: Accuplacer percentile scores - Arithmetic.

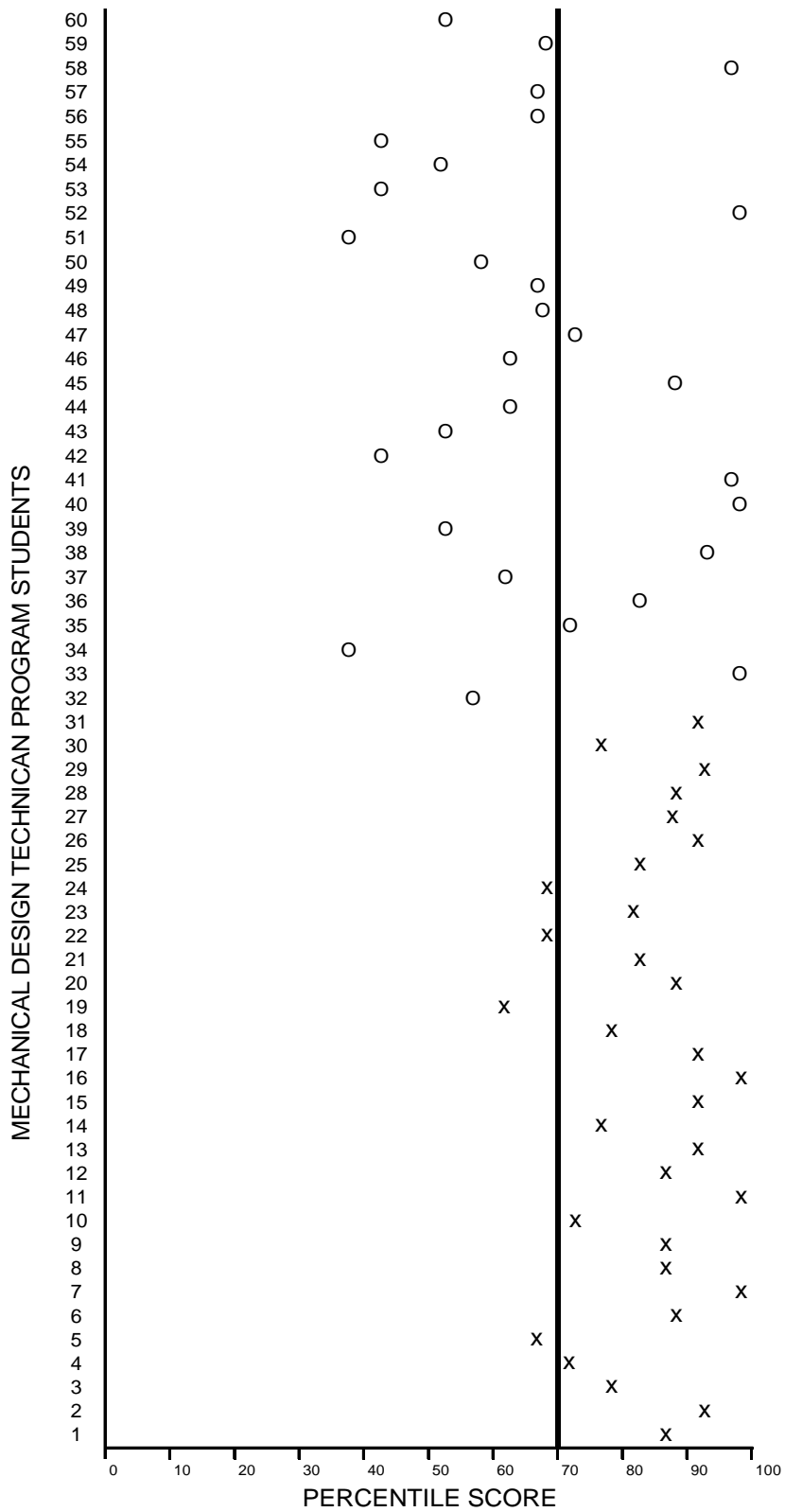


Diagram 4: Accuplacer percentile scores - Elementary Algebra.

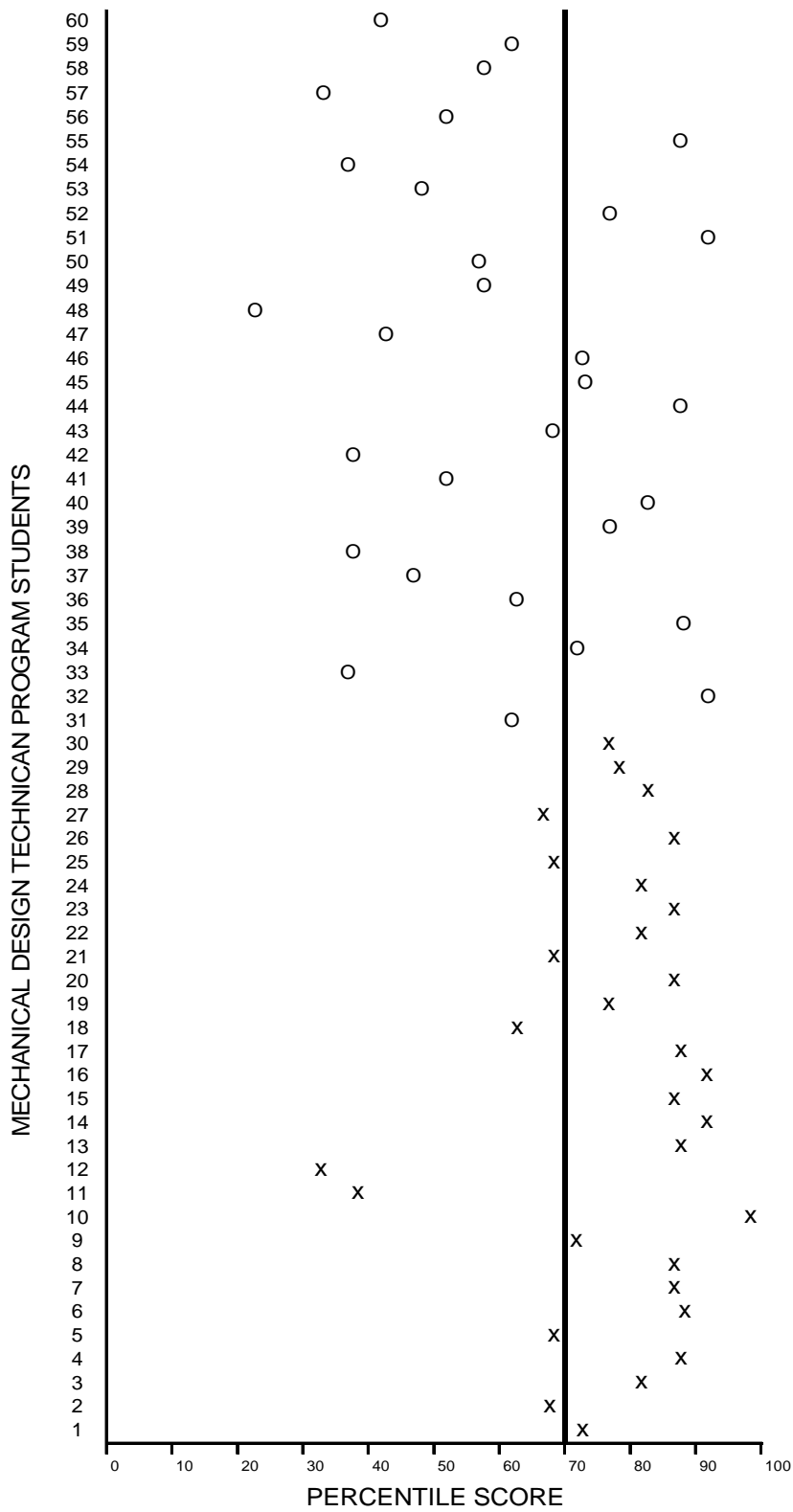


Diagram 5: DAT percentile scores - Mechanical Aptitude.

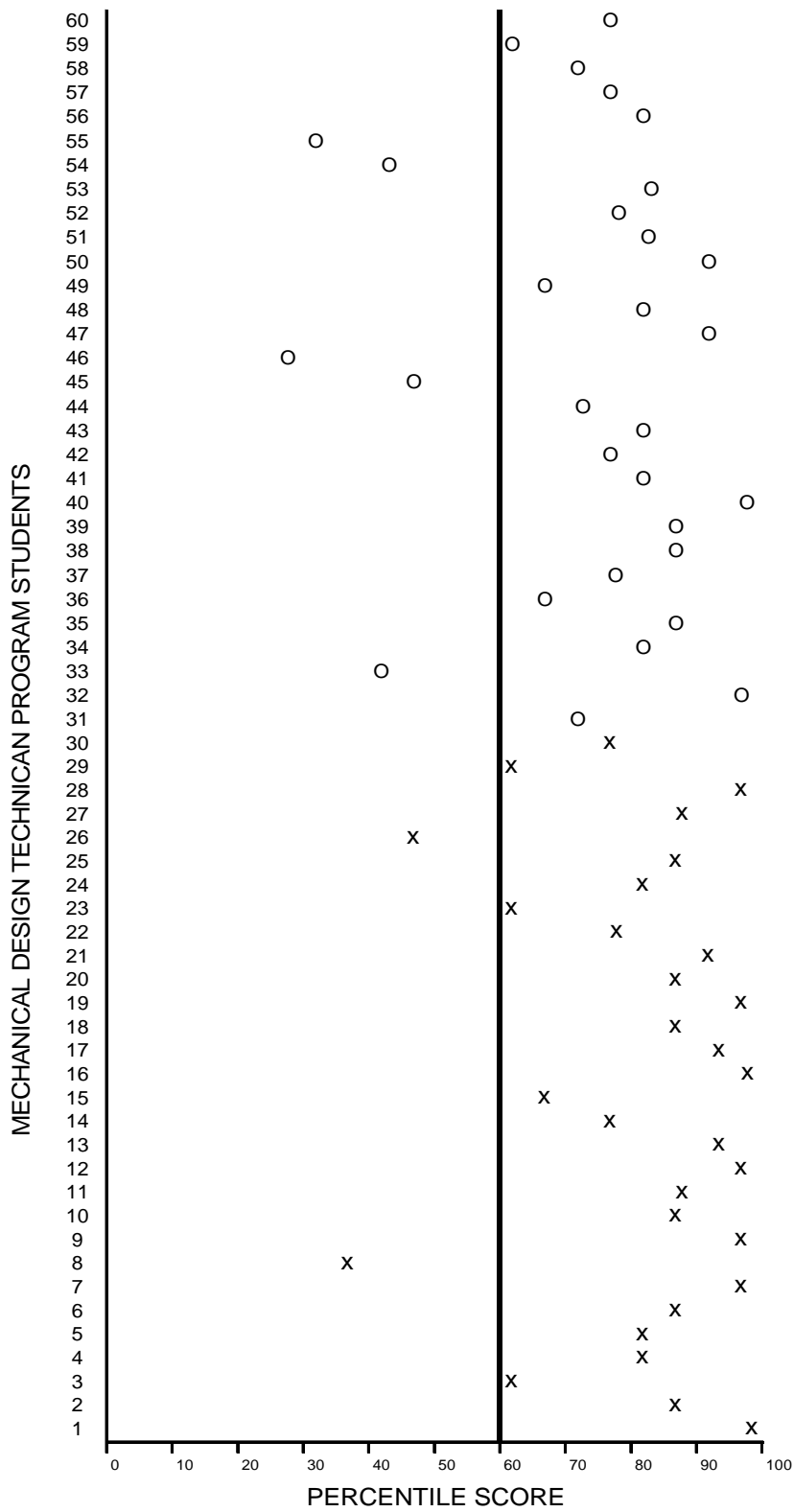
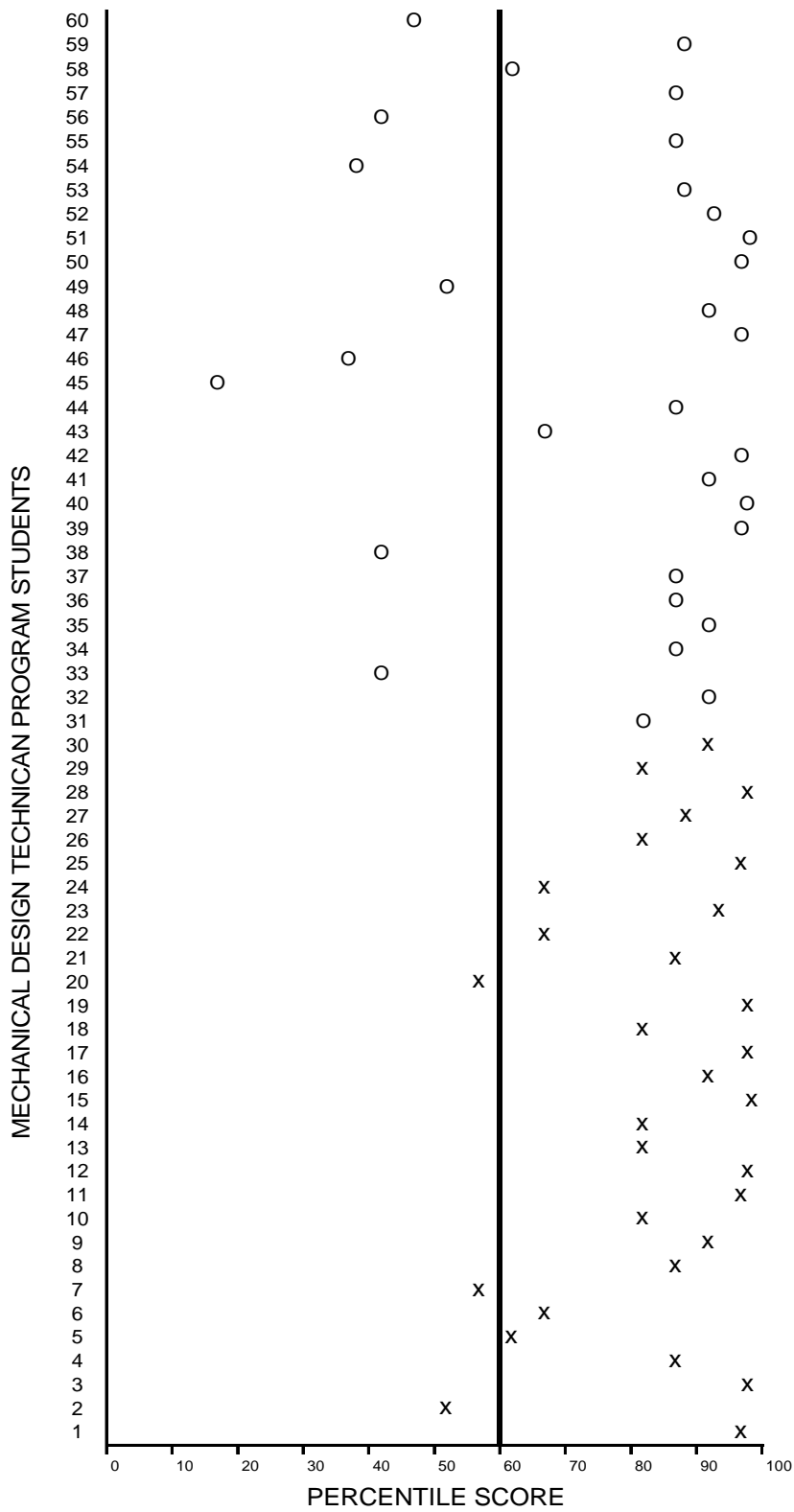


Diagram 6: DAT percentile scores - Spatial Aptitude.



CHAPTER V: DISCUSSION

Introduction

This discussion will restate the limitations of the study, summarize the findings of the study, state general conclusions and important results, and presents recommendations for future action and further study.

Limitations

It is unknown whether students were non-completers due to academic reasons or if they do not complete the program for other reasons.

There is no archival testing data available from more than five years ago since Northcentral Technical College does not store this type of information for more than five years.

Not all students complete the MDT program at NTC in less than five years. Students may be categorized as non-completers, but may return at a much later date to complete the program.

Test scores could be lower than a student's actual skill level due to anxiety caused by test taking. Or, if students are not comfortable using computers, test scores could be lower due to the test being administered via computer. Because test scores reflect student's skills at the time they take the test, scores could be lower if the students are "non-traditional" in the sense that they have been away from school for a while.

Archival data may have been recorded incorrectly into the testing data bases and incorrect data may have been retrieved by the researcher, student services personnel, and the testing department.

Discussion

The purpose of this study was to determine if a correlation exists between the results of Northcentral Technical College's entrance exams, the Accuplacer and the DAT, and the potential for a MDT student to be a completer or a non-completer.

Archival Accuplacer and DAT test score data for MDT program completers and non-completers was retrieved and presented on six scatter diagrams for comparison. MDT program completers averaged higher percentile test scores than non-completers in all six test areas.

As a predictor of success in the MDT program the Accuplacer correctly identified completers or non-completers of the MDT program based on the current NTC recommended percentile for admission; in Reading 56.5% of the time, in Sentence Skills 53% of the time, in Arithmetic 75% of the time, and in Elementary Algebra 68.5% of the time. Accuplacer validity studies report an observed predictability rate of 69%.

DAT predicts high average to superior likelihood of success in persons scoring at 55th percentile or higher in mechanical aptitude and spatial relations aptitude. This study indicated that 88% of those taking the DAT mechanical aptitude test scored higher than 55th percentile, yet 47% of those scoring higher than the 55th percentile did not complete the program. 81.5% of those students taking the spatial relations aptitude test scored higher than the 55th percentile and 45% of that group did not complete the program.

Conclusions

Percentile test scores in Accuplacer testing of Reading and Sentence Skills, and the DAT testing of Mechanical Aptitude, and Spatial Aptitude did not show a predictability of a student's ability to be a completer or non-completer of Northcentral

Technical College's MDT program, as frequently as published Accuplacer and DAT validity testing suggests. Accuplacer percentile test scores for Arithmetic and Elementary Algebra did appear to be more in line with Accuplacer and DAT validity tests as predictors of Northcentral Technical College's MDT program completion, with 24% of the students scoring below the current recommended percentile score historically completing the MDT program and 70% of those scoring equal to or greater than the recommended percentile completing the program.

Recommendations

It is recommended that student counselors and student remedial studies advisors/instructors be made aware of the predictability of success in the MDT program at Northcentral Technical College based on Accuplacer percentile test scores in Arithmetic and Elementary Algebra. Students scoring below the recommended minimum percentile for admission should be advised of the predictability of success, allowing them to make an informed decision regarding whether they should pursue a degree as a Mechanical Design Technician. Math remediation should be followed by additional testing before admission into the MDT program to determine the increased level of math skills and abilities.

Recommendations for future studies may find value in investigating the effectiveness of Arithmetic and Elementary Algebra remediation for entrance into the MDT program. Additional studies may include the effects on students who are allowed admission into the MDT program when they do not possess the math skills level that could predict one's ability to complete Northcentral Technical College's MDT program. It may be of value to study whether the math rigor currently incorporated in NTC's MDT

program is meeting or exceeding the needs of businesses hiring Mechanical Design Technician graduates.

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