UTILIZING WORKKEYS AS A MEASURE OF COMMUNITY AND
TECHNICAL COLLEGE STUDENT SUCCESS

By

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WorkKeys assessments are gaining in popularity for use within public secondary and postsecondary institutions as well as business and industry. WorkKeys assessments utilize nine different assessments in nine different subject areas to determine if a person is prepared for the workplace and/or workforce training programs.

The research study presented here examined the use of WorkKeys as a measure of success for community and technical college students. The purpose of the research study was to examine WorkKeys assessment score level scores and determine if relationships existed between WorkKeys scores and grades and WorkKeys scores and cumulative grade point averages.

The researcher used a quantitative research design and utilized correlational statistics to determine if relationships existed. Data include WorkKeys scores, course grades, and cumulative grade point averages from the years of 2005 through 2008. Data were retrieved from an existing database and analyzed during spring 2009. Data from 7 different colleges were analyzed.
General findings showed there were weak correlations between WorkKeys assessment scores and grades of C or better in college level reading and mathematics courses. Findings also indicated weak correlations between WorkKeys assessment scores in reading for information and applied mathematics and cumulative grade point averages.

Recommendations include further quantitative research within other state community and technical colleges. Controlled studies by ACT, Inc., and/or others are also suggested whereby other variables that could affect test scores or class grades are evaluated.

Key words: WorkKeys, community and technical colleges, reading for information, applied mathematics, locating information
DEDICATION

This dissertation is dedicated to my family, friends, supervisors, coworkers, and professors who encouraged me to achieve this milestone in my educational journey.
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It has been overdue that I complete my dissertation and that my status of being in limbo end. I would like to acknowledge the following people who have encouraged me and given me the tools I needed to finish this journey. Dr. Allen Goben, President of Hazard Community and Technical College (HCTC), and Dr. Kathy Smoot, Provost of HCTC, have given me the time I needed to complete the project as well as support and constructive feedback. Myla Barrett, Administrative Assistant for Learning Services, deserves many thanks for keeping the office running while I was at home working at my kitchen table on my laptop. I had much support and encouragement from coworkers who are also my friends at HCTC. They never let me give up.

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# TABLE OF CONTENTS

**DEDICATION** ................................................................................................................. ii  
**ACKNOWLEDGMENTS** .................................................................................................. iii  
**LIST OF TABLES** ........................................................................................................ viii  

## CHAPTER

### I. INTRODUCTION ............................................................................................................. 1

- Introduction to the Study ................................................................................. 1  
- Statement of the Problem .............................................................................. 2  
- Purpose of the Study ...................................................................................... 3  
- Research Questions .......................................................................................... 4  
- Definition of Terms/Acronyms ...................................................................... 5  
- Overview of Research Methodology .............................................................. 8  
- Significance of Topic/Justification of Study .................................................. 8  
- Researcher’s Perspective ............................................................................... 9  
- Organization of Study .................................................................................... 10

### II. LITERATURE REVIEW .............................................................................................. 11

- Chapter Overview .......................................................................................... 11  
- Community and Technical College Student Success Research ................... 12  
- Related WorkKeys Research Studies ............................................................ 14  
- History of Testing ........................................................................................... 17  
- WorkKeys Overview ...................................................................................... 17  
  - Reading for information ........................................................................... 17  
  - Applied mathematics .......................................................................... 18  
  - Locating information ............................................................................ 19  
- WorkKeys Summary ..................................................................................... 20  
- WorkKeys as an Indicator of College and Workforce Readiness Success ..... 21  
- Other Career-Related Assessment Tools ..................................................... 25  
- Training Curriculum for WorkKeys ............................................................. 26  
- WorkKeys and Business and Industry ......................................................... 28  
- No Child Left Behind Act and WorkKeys ............................................... 29  
- WorkKeys in Secondary Institutions ......................................................... 30
WorkKeys in Community and Technical Colleges ........................................32
History of WorkKeys in the Kentucky Community and Technical College System (KCTCS) .................................................................34
Chapter Summary ................................................................................36

III. METHODOLOGY/RESEARCH DESIGN .................................................37
Chapter Overview ..............................................................................37
Research Design and Rationale ..........................................................37
Participants and Site ..........................................................................40
Instrumentation/Data Collection .......................................................43
Procedure ..........................................................................................45
Data Analysis/Measures ....................................................................46
Ethical and Legal Considerations .......................................................47
Research Timetable and Implementation ............................................47
Chapter Summary ..............................................................................47

IV. DATA ANALYSIS AND FINDINGS .......................................................48
Purpose ..............................................................................................48
Analysis ..............................................................................................48
Research Question Findings ..............................................................49
    Research Question 1 .....................................................................49
    Research Question 2 ..................................................................50
    Research Question 3 ..................................................................52
    Research Question 4 ..................................................................53
    Research Question 5 ..................................................................54
    Research Question 6 ..................................................................56
    Research Question 7 ..................................................................57
    Research Question 8 ..................................................................58
    Research Question 9 ..................................................................59
    Research Question 10 .................................................................60
Chapter Summary ..............................................................................61

V. RECOMMENDATIONS, CONCLUSIONS AND SUMMARY ...................63
Purpose ..............................................................................................63
Results Summary ..............................................................................63
    Research Question 1 ..................................................................63
    Research Question 2 ..................................................................64
    Research Question 3 ..................................................................64
    Research Question 4 ..................................................................65
    Research Question 5 ..................................................................65
    Research Question 6 ..................................................................66
    Research Question 7 ..................................................................66
Research Question 8 .......................................................................................66
Research Question 9 .......................................................................................67
Research Question 10 .......................................................................................67
Discussion ........................................................................................................67
Implications .......................................................................................................68
Study Limitations ..............................................................................................69
Recommendations/Further Study .....................................................................72

BIBLIOGRAPHY ................................................................................................75

APPENDIX

A. MSU IRB APPROVAL LETTER ....................................................................82
B. KCTCS APPROVAL LETTER .......................................................................84
C. ACT APPROVAL LETTER ............................................................................86
D. PRESIDENTS’ APPROVAL LETTER ...............................................................88
# LIST OF TABLES

<table>
<thead>
<tr>
<th></th>
<th>Correlation Results of WorkKeys Applied Mathematics Level 3 Scores and Higher and College Level Mathematics Course Grades of C or Higher</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Correlation Results of WorkKeys Reading for Information Level 3 Scores and Higher and College Level Reading Course Grades of C or Higher</td>
<td>51</td>
</tr>
<tr>
<td>3</td>
<td>Correlation Results of WorkKeys Applied Mathematics Assessment Level 5 Scores and Higher and College Level Mathematics Course Grades of C or Higher</td>
<td>52</td>
</tr>
<tr>
<td>4</td>
<td>Correlation Results of WorkKeys Reading for Information Assessment Level 5 Scores and Higher and College Level Reading Course Grades of C or Higher</td>
<td>54</td>
</tr>
<tr>
<td>5</td>
<td>Correlation Results of WorkKeys Locating Information Level 3 Scores and Higher and Other College Level Course Grades of C or Higher</td>
<td>55</td>
</tr>
<tr>
<td>6</td>
<td>Results of Correlation Between WorkKeys Reading for Information Assessment Scores and Students’ Cumulative Grade Point Averages</td>
<td>56</td>
</tr>
<tr>
<td>7</td>
<td>Results of Correlation Between WorkKeys Applied Mathematics Assessment Scores and Students’ Cumulative Grade Point Averages</td>
<td>57</td>
</tr>
<tr>
<td>8</td>
<td>Results of Two Sample $t$-Test Comparing WorkKeys Reading for Information Assessment Mean Scores of Healthcare Majors and Non-Healthcare Declared Majors</td>
<td>58</td>
</tr>
<tr>
<td>9</td>
<td>Results of Two Sample $t$-Test Comparing WorkKeys Applied Mathematics Assessment Mean Scores of Healthcare Majors and Non-Healthcare Declared Majors</td>
<td>60</td>
</tr>
</tbody>
</table>
Results of Two Sample $t$-Test Comparing WorkKeys Applied Mathematics Assessment Mean Scores Between Males Versus Females.................61
CHAPTER I

INTRODUCTION

Introduction to the Study

As WorkKeys assessments are gaining in popularity as a way to document workplace readiness, increased emphasis is also being placed on utilizing the assessments as predictors for college preparedness and success (American College Testing, Inc. [ACT], n.d.i). In 2005, ACT published a study entitled Crisis at the Core: Preparing All Students for College and Work, “which attempted to bring light to the fact that high school students were underprepared for both college and the workplace” (p. 7). In 2006, ACT published another study entitled Ready for College and Ready for Work: Same or Different? where findings determined that students graduating from high school need the same fundamental and soft skills to be successful in college as they need to be successful in the workplace. Prior to publishing these two studies, ACT had developed an assessment tool for determining workplace readiness titled the WorkKeys System, or WorkKeys. This system attempted to fill a void whereby those who wanted to enter the workforce rather than attend a 4-year college could be assessed. This was not currently being done with ACT, Inc.’s more commonly known ACT, which focused on those whose primary goal was to enter a 4-year postsecondary institution.
A January 2007 report published by Educational Testing Services (ETS), entitled America’s Perfect Storm discussed the importance of several major factors in today’s workforce: (a) the increasing aging and diverse population, (b) the growing number of technical jobs being created, and (c) the underprepared workforce (Kirsch, Braun, Yamamoto, & Sum, 2007). Upon review of existing literature such as the ETS report, the researcher discovered a growing concern about the preparedness of the workforce and of those entering U.S. colleges. This research was an effort to look at the WorkKeys system and the assessment’s use as a measure of success for those enrolled in community and technical colleges within the Kentucky Community and Technical College System (KCTCS).

**Statement of the Problem**

As stated at the 2009 WorkKeys National Conference, the nation is threatened in the global economy by the shortage of skilled workers. Friedman (2005) discussed the need for highly skilled technical employees who can problem solve, communicate, and utilize critical thinking skills.

Since their beginnings in the early 20th century, community and technical colleges in the U.S. have been given the charge of not only training the nation’s technical workforce but also providing a 2-year general education curriculum for transfer students. Accrediting agencies and businesses are demanding a way to document that these students are work and college ready.

Research and case study assessment examples exist of how WorkKeys has been implemented successfully in various types of business and industry settings to make
hiring and promotional determinations (ACT, n.d.a) Supporting data also exists showing the successful implementation of WorkKeys within the public high school arena (ACT, n.d.d). Research is present regarding the various training curricula that can assist students in achieving their desired WorkKeys score levels. Although known that WorkKeys is a tool being used by community and technical colleges and that the community and technical colleges are being asked to deliver a 21st century scholar to businesses and 4-year universities, there is little to no research on how a student who scores well in the WorkKeys assessments performs once he or she enters the community and technical college.

**Purpose of the Study**

The primary purpose of the research was to determine if correlations existed between students’ scores on the WorkKeys assessments of applied mathematics, reading for information and locating information and the students’ grades in associated college level applied mathematics, reading and other college classes as defined in the study. Students’ overall cumulative grade point averages in comparison with the WorkKeys assessment scores in reading for information and applied mathematics were also examined. The research study also compared the WorkKeys scores in reading for information and applied mathematics for students enrolled in healthcare majors at the community and technical colleges with the WorkKeys scores of students enrolled in non-healthcare declared majors at the community and technical colleges. Finally, the research study compared WorkKeys applied mathematics scores of males and females. There were no preferential treatments, study guides, or aides of any sort prior to the WorkKeys
testing of the students. This ex post facto study includes data presented from the WorkKeys testing.

**Research Questions**

This study sought to answer the following research questions:

1. Is there a relationship between students’ scores of level 3 or higher in the WorkKeys assessment of applied mathematics and grades of C or higher in the first college level mathematics course in which students were enrolled at the community and technical college?

2. Is there a relationship between students’ scores of level 3 or higher in the WorkKeys assessment of reading for information and grades of C or higher in the first college level reading course in which the students were enrolled at the community and technical college?

3. Is there a relationship between students’ scores of level 5 or higher in the WorkKeys assessment of applied mathematics and grades of C or higher in the college level mathematics class in which students were enrolled at the community and technical college?

4. Is there a relationship between students’ scores of level 5 or higher in the WorkKeys assessment of reading for information and grades of C or higher in the college level reading class in which they were enrolled at the community and technical college?

5. Is there a relationship between students’ scores of level 3 or higher in the WorkKeys assessment of locating information and grades of C or higher
in their other college level courses, including introduction to computers, physics, communication, art, and blueprint reading, in which they are enrolled at the community and technical college?

6. Is there a relationship between students’ cumulative grade point averages and WorkKeys reading for information assessment scores?

7. Is there a relationship between students’ cumulative grade point averages and WorkKeys applied mathematics assessment scores?

8. Is there a difference in the mean scores of the WorkKeys reading for information assessment between non-healthcare-declared technical majors enrolled within the KCTCS?

9. Is there a difference in the mean scores of the WorkKeys applied mathematics assessment between non-healthcare-declared technical majors enrolled within the KCTCS?

10. Is there a difference in the mean scores of the WorkKeys applied mathematics assessment between males and females enrolled within the KCTCS?

**Definition of Terms/Acronyms**

The following definitions are presented to provide clarifications and meaning throughout the study.

1. *ACT* refers to American College Testing System, a company that develops pre-college screening tools (ACT, n.d.b).
2. *WorkKeys* represents a series of tests developed by ACT to assess basic workplace skills in eight skill areas, including reading for information, applied mathematics, locating information, applied technology, observation, teamwork, listening, writing, and business writing (ACT, n.d.i).

3. *Targets for Instruction* are books to be used as tools developed by ACT for educators to work with students in order to improve test scores. ACT gives suggested activities that can be used in the classroom to improve test scores (ACT, n.d.h).

4. *Key Train* is a computer-based, self-directed system for improving *WorkKeys* scores (KeyTrain, n.d.c).

5. *WIN* represents Worldwide Interactive Network, a product used to improve *WorkKeys* scores that comes in online form, CDs, or workbooks (Worldwide Interactive network, [WIN], n.d.).

6. *Carl D. Perkins Vocational and Technical Education Improvement Act* is a federal act originally passed in 1984 and reauthorized in 1998 and 2006. Current legislation authorizes the act through 2012. This legislation calls for increased focus on the academic achievement of career and technical education students, calls for improved state and local accountability, and strengthens the ties of secondary and postsecondary education in this area (U.S. Department of Education, n.d.a).
7. *National Career Readiness Certificate* is a certificate developed by ACT to prove workplace basic skills in reading for information, applied mathematics, and locating information (ACT, 2009f).

8. *Kentucky Employability Certificates* are career readiness certificates used in the state of Kentucky to demonstrate successful workplace skills in reading, mathematics, and locating information (Kentucky Community and Technical College System [KCTCS], n.d.).


10. *Southern Association of Colleges and Schools (SACS)* is a regional accrediting body for Southern state educational institutions (Southern Association of Colleges and Schools [SACS], n.d.).

11. *Adult Measure of Essential Skills*, also known as AMES, measures basic workplace skills for adults (National Institute for Literacy, n.d.).

12. *Assessments in Career Education*, also known as ACE, is a California-based career readiness assessment for an adult that looks at career readiness in particular areas, such as agriculture and health care (Educational Data Systems, n.d.).
13. *O’NET*, or U.S. Department of Labor Occupational Network Database, is the U.S.’s main source of occupational listings and requirements (*O’NET*, n.d.).

14. *National Occupational Competency Testing Institute (NOCTI)* is a provider of occupational testing services. This also stands for the name of the organization’s occupational-related test (*National Occupational Competency Testing Institute [NOCTI]*, n.d.).

15. *WorkKeys Occupational Profile Database* is ACT, Inc.’s database that corresponds with *O’NET* and combines ACT job profiles to make generalizations regarding specific occupations (*ACT*, n.d.a).

**Overview of Research Methodology**

The data used in this quantitative research study were ex post facto for community and technical college students. Because WorkKeys concentrates on workforce readiness, the student scores examined were from those enrolled in Associate in Applied Science degree programs. The study employed the correlational research method. The Pearson correlation was calculated to determine existence of relationships and degree of correlation. As standardized tests, WorkKeys assessments have been addressed in regard to content validity and reliability.

**Significance of Topic/Justification of Study**

WorkKeys is gaining in popularity as a common metric that can be utilized for educators and employers. A national conference is held every year to assist in making people more aware of the assessment’s benefits. Although research exists regarding *ACT*,
Inc.’s, more commonly known exam, which measures college readiness, as well as WorkKeys’ use within business and industry, little to no research exists examining WorkKeys as a measure of community and technical college preparedness or success.

The findings from the research study demonstrate the benefits or lack of benefits when WorkKeys is utilized within a community and technical college system as an indicator of college success rather than as an indicator of workplace success. There is an effort in vocational/technical education for students, educators, employers, and communities to understand that the same skills needed to enter college and be successful are the same skills needed to enter the workforce and be successful (ACT, n.d.i). This study may be the basis for other community and technical colleges to conduct their own WorkKeys research. The research study’s findings will also build data collection and analysis of WorkKeys assessment scores of people enrolled in community and technical college programs with college class success rates of the same individuals.

**Researcher’s Perspective**

The researcher involved in this study is a WorkKeys certified job profiler and a community and technical college employee who also serves as administrator of the WorkKeys Scoring Center/WorkKeys Solutions Provider at Hazard Community and Technical College. While the experience and job duties of the researcher afford unique possibilities for applying interpretations of the study results, objectivity was ensured through detailed quantitative analysis of data.
**Organization of Study**

Chapter one of this study presents a brief history of WorkKeys, including definitions of terms associated with WorkKeys. Chapter two provides a review of existing literature surrounding WorkKeys. Chapter three provides explanation of the research design and data analysis methods employed in the research study. Chapter four presents the results of the data analysis. Finally, chapter five gives recommendations and a summary of the research study.
CHAPTER II
LITERATURE REVIEW

Chapter Overview

The purpose of this chapter is to provide information based on a review of the literature associated with community and technical college student success as well as related research findings regarding WorkKeys and other assessments. The literature review provides the following:

- Community and technical college student success research
- Related WorkKeys Research Studies
- An overview of WorkKeys
- WorkKeys as an indicator of college and workforce readiness success
- An overview of other career-related assessment tools
- An overview of WorkKeys training curriculum
- An overview of WorkKeys and use with business and industry
- The No Child Left Behind Act and WorkKeys implications
- An overview of WorkKeys use in secondary institutions (primarily public high schools)
- An overview of WorkKeys assessments and their use within community and technical colleges
- An overview of WorkKeys specific use within KCTCS
Community and Technical College Student Success Research

Research studies exist regarding the success of community and technical college students in a variety of settings and with a variety of predictors. In a research study conducted by Pritchett, the author examined the success of community and technical college online students utilizing a survey. The findings from the study concluded that there were a number of variables that affect the success of a student in a course such as course format and experience with the instructor (Pritchett, 2009). Gruenbaum (2010) found that other indicators predicted online course success as well such as age and design models for the class. Other factors influencing college success were reviewed by Wetstein (2009) regarding multivariate models of student success. Wetstein noted orientations and counseling services would aide student success once they were enrolled in college.

A study conducted by Neal (2002) examined extra-curricular activities as indicators of college success. In Neal’s study, students at California State University completed a survey about extracurricular activities they had been in involved in during high school. The students were asked to record their current grade point averages. The ages of those responding ranged between 20 and 49 years of age with the majority being between 20 to 29 years of age (Neal). T-test results showed that there was no significant evidence to support the hypothesis that extra-curricular activities in high school resulted in success in college as measured by grade point average (Neal).

Comparisons were made between high school academic paths, grade point averages and ACT composite scores as predictors of success at Walters State Community College (Reuschel, 2009). The study included 797 high school students entering the
college in fall semester 2007 and completing their first academic year in spring semester 2008 (Reuschel, 2009). Reuschel found that university path students were (a) more likely to have a higher high school grade point average, (b) more likely to have a higher college grade point average and had earned more college credit hours at the end of the first semester and year, and (c) were less likely to enroll in remedial and developmental courses. Reuschel also found that a moderate positive relationship between high school grade point averages and college grade point averages. Finally, high school grade point averages and ACT scores were found to be statistically significant in predicting the number of college credit hours earned in Reuschel’s study. College credit hours earned is often considered a measure of college academic success.

Grade point averages and reading assessments as success indicators were reviewed in a 2006 research study. Cook’s (2006) study results indicated that reading comprehension measured by the Nelson-Denny Reading Test was an effective means for determining possible academic success or failure of the nursing students in her research sample. Cook also found a positive relationship between grade point averages for prerequisite science courses, overall cumulative grade point average and grade point average for the first semester nursing students.

High school grade point averages, high school math courses, and the retention of honors scholarships were reviewed in a study conducted by Megert (2005). Megert found that while advanced math courses taken while in high school was not a sole indicator of honor scholarship retention at the college level, when the math courses combined with high school grade point averages were examined, there was a significant indication of retention of honors scholarships.
In a study conducted by Noble and Sawyer (2002), high school grade point averages and ACT composite scores were jointly reviewed as predictors of academic success. Noble compared the effectiveness of ACT composite scores and high school grade point averages for predicting different levels of first-year college grade point averages (GPA). The study found that both high school GPA and ACT composite scores were effective in predicting success at the 2.0, 2.50, and 3.0 levels of first-year college GPA (Noble & Sawyer). Noble and Sawyer’s study found that high school GPA was not an effective measure of success at the higher levels of first-year college GPA but that the ACT composite score was effective at all first-year college GPA levels.

Analysis of workforce readiness as a success indicator utilizing WorkKeys was recently evaluated in a 2006 research study conducted by Kennedy when he looked at a sample of recent high school graduates from Minnesota preparing to enter the workforce and or workforce training program. Statistical analysis of Kennedy’s results showed that high school graduates appeared to be graduating with inconsistent score levels of workforce readiness skills. Results of Kennedy’s study also indicated that learners can accurately estimate their own workforce readiness score levels.

**Related WorkKeys Research Studies**

A few dissertation research studies surrounding WorkKeys exist. Hendrick conducted a study in 2006 where he reviewed utilizing WorkKeys as a pre-employment assessment tool to increase employee retention. Hendrick conducted quantitative analysis of 757 applicants’ test scores and qualitative analysis of interviews with 12 companies. Findings of Hendrick’s study indicated companies using WorkKeys as a pre-employment
assessment were pleased with the quality of employees they were receiving after testing and the retention rates of these employees was higher than before with employees who had not been pre-screened.

In 2000, Belton studied WorkKeys assessments and compared groups of technical completers at a Mississippi community college. In Belton’s study, the WorkKeys scores of two groups were compared. One group comprised of the 1-year technical completers while the other group comprised of the 2-year technical completers. Results showed that, overall, 2-year completers scored higher than the 1-year technical completers in WorkKeys assessments.

Research in the specific WorkKeys reading for information and applied mathematics conducted in 2002 by Barnes looked at statistically significant differences in the two assessments based on race, gender, and overall educational score levels. Barnes examined assessments for over 3,000 high school, technical college, and 2-year college students as well as incumbent workers. Barnes found no significant differences in the results between genders. However, significant differences were uncovered between educational score levels as well as African-American and Caucasian test takers in the reading for information and applied mathematics assessments.

A similar study examined differences in WorkKeys assessments of reading for information, locating information, and applied mathematics based on gender, age, and race (Stone, 2007). Stone found differences in the applied mathematics scores with older test takers scoring significantly less than their younger counterparts. In addition, Stone found that older test takers did not score as well on the reading for information or locating information exams either. Significant differences were also found in scores in all
three WorkKeys assessments in regard to race with Caucasians scoring higher than African Americans. In regard to gender, Stone found significant differences within the applied mathematics assessment with females scoring less than males. The sample in Stone’s study was one Alabama community college that included technical program area students as well as incumbent workers of multiple employers and was comprised of 6,962 records.

Another study that examined the WorkKeys applied mathematics, locating information, and reading for information included a sample of incarcerated individuals and compared the three WorkKeys assessments and the Test of Adult Basic Education (TABE) exam commonly used in adult education (Buchanan, 2000). Buchanan looked at comparisons between TABE and WorkKeys applied mathematics and reading for information assessment scores. The study was comprised of incarcerated individuals and analysis involved the variables age, and employment status prior to incarceration. Results indicated that WorkKeys assessment results were higher for older individuals and for those who were employed prior to incarceration.

One final notable research study involving WorkKeys was conducted by Bowles in 2004 where he looked at the possibility of using WorkKeys for placement into college level reading, mathematics and English courses. Bowles correlated WorkKeys with the Assessment of Scholastic Skills Through Education Testing (ASSET) exam (commonly used for academic placement) and performed regression analysis as well. His conclusion was that the correlations were not strong enough to support the use of WorkKeys for placement into standard academic courses.
History of Testing

Standardized testing, such as WorkKeys and the ACT, has a long history. The earliest record of standardized testing comes from China in the areas of philosophy and poetry (Fletcher, 2009). In ancient Greece, Socrates tested his students by asking questions (Fletcher, 2009). The Scholastic Aptitude Test (SAT) and the ACT are the most famous standardized tests today. There are also SAT II tests, Advanced Placement (AP) exams, the Pre Scholastic Aptitude Test (PSAT), ACT and a variety of pre-ACT exams, as the battery of standardized assessments continues to grow (Fletcher, 2009). The use of standardized graduation exams for colleges and high schools is also on the rise (Dorn, 2003). Standardized testing is popular in education for multiple reasons, including the issue of accountability and is often linked to funding at the state and local levels. It should be noted that any standardized testing utilized by an educational institution or employer should be evaluated for reliability and validity (Moriarty, 2002).

WorkKeys Overview

As per the WorkKeys Web site, a breakdown of each of the WorkKeys foundational skills as focused on in this study follows.

Reading for information

The WorkKeys reading for information assessment measures the skills people use when they read and use written text in order to perform job duties (ACT, n.d.g). The written texts could include memos, letters, directions, signs, notices, bulletins, policies, and regulations. Reading for information materials do not include information that is presented graphically, such as in charts, forms, or blueprints.
There are five score levels of difficulty in reading for information. Score level 3 is the least complex, and score level 7 is the most complex. The score levels build on each other; each incorporating the skills assessed at the preceding score levels. For example, at score level 5, individuals need the skills from score levels 3, 4, and 5. The reading materials at Score level 3 are short and direct. The material becomes longer, denser, and more difficult to use as readers move toward score level 7. At score level 3, readers begin by finding very obvious details and following short instructions. At the more complex score levels, tasks can also involve more application and interpretation (ACT, n.d.g).

Reading for information is the only WorkKeys exam that has been correlated to grade level. According to a 2006 ACT, Inc., publication, a score level 3 in Reading for information is equivalent to a fifth-grade reading level. Scoring a level 4 means the examinee can read at grade level 6 or 7. Score level 5 in reading for information is equivalent to an 11th-grade reading score level. Score level 6 is equivalent to a freshman or sophomore score level in college, while earning a score level 7 in reading for information in WorkKeys is equivalent to a graduate school score level of reading (ACT, 2006a).

Applied mathematics

The WorkKeys applied mathematics assessment measures the skill people use when they apply mathematical reasoning, critical thinking, and problem-solving techniques to work-related problems (ACT, n.d.c). The test questions require the examinee to set up and solve the types of problems and do the types of calculations that actually occur in the workplace (ACT, n.d.c). This test is designed to be taken with a
calculator. A formula sheet that includes all formulas required for the assessment is provided (ACT, n.d.c). While individuals may use calculators and conversion tables to help with the problems, they still need to use mathematics skills to think them through (ACT, n.d.c). There are five score levels of difficulty. Score level 3 is the least complex, and score level 7 is the most complex. The score levels build on each other; each incorporating the skills assessed at the previous score levels. For example, at score level 5, individuals need the skills from score levels 3 and 4 in addition to being able to perform at a score level 5 (ACT, n.d.c).

Locating information

Locating information is the skill people use when they locate, synthesize, and use information from workplace graphics such as charts, graphs, tables, forms, flowcharts, diagrams, floor plans, maps, and instrument gauges; it is a basic skill required in today’s workforce (ACT, n.d.f). The WorkKeys locating information assessment measures the skill people use when they work with workplace graphics. Examinees are asked to find information in a graphic or insert information into a graphic (ACT, n.d.f). They also must compare, summarize, and analyze information found in related graphics.

There are four score levels of difficulty. Score level 3 is the least complex, and Score level 6 is the most complex. At score level 6, examinees may use the information in one or more complex graphics to draw conclusions and make decisions. The complexity can also increase as the quantity and/or density of the information increases (ACT, n.d.f).
WorkKeys Summary

The WorkKeys assessments were developed by industrial psychologists at ACT along with help from business and industry leaders. Per ACT, Inc., WorkKeys is being used in all 50 states with 16,942 job profiles conducted and over 15 million WorkKeys tests administered (Palmer, personal communication, December 3, 2009). There are nine total WorkKeys assessment areas including applied mathematics, reading for information, locating information, applied technology, observation, teamwork, listening, writing, and business writing. Examinees may earn scores of levels 3–7 depending on the assessment (ACT, n.d.e). These score levels are defined by ACT in regard to how the examinee performs. They are in no way related to grade levels, except for Reading for information. The score levels and what they mean are defined in the various reports that are printed and given to the examinees, including a report entitled “Memo to the Examinee,” a roster, and a summary report. The WorkKeys assessments are appropriate for grades 7 and above but are targeted to high school juniors and seniors, recent high school graduates, college students, and both new and incumbent workers (ACT, n.d.i). ACT conducted a marketing campaign to educate business and education on the WorkKeys system and how the system can be utilized to measure workplace basic skills and provide proof of a trainable workforce. States such as Iowa, Oklahoma, Kentucky, and Tennessee are implementing WorkKeys in their secondary and postsecondary educational systems so students can demonstrate basic skills necessary for workplace as well as college success (ACT, n.d.i). Companies in numerous states are requesting WorkKeys assessments for pre-employment screening (ACT, n.d.i).
ACT recently developed a National Career Readiness Certificate, which includes the WorkKeys assessments of reading for information, applied mathematics, and locating information (ACT, 2009f). Other states, such as Kentucky with the Kentucky Employability Certificate (KEC), also developed career or employability certificates based on WorkKeys and the three identified foundational assessments of Reading for information, applied mathematics, and Locating Information. In conversations with KCTCS Chancellor Dr. Bird, he stated, “What we’re trying to do is provide Kentucky—the workforce, students, and employees—with portable credentials which document transferable basic skills” (Bird, personal communication, November 12, 2008). With the KEC certificates, earning a score level 4 in each assessment earns an examinee a silver rating or certificate, and earning a score level 5 in each assessment earns an examinee a gold rating or certificate (KCTCS, n.d.). Per ACT, the silver indicates a person qualifies for 65% of jobs in the WorkKeys database, and earning a score level 5 in all areas indicates he or she is qualified for 90% of all jobs in the WorkKeys database (ACT, Inc., n.d.e).

**WorkKeys as an Indicator of College and Workforce Readiness Success**

Many data regarding the ACT exist, and the assessment has been widely known for use as an indicator of college success. However, little information exists regarding WorkKeys and its use as a college performance indicator. The Commonwealth of Kentucky’s public school system has made a heavy investment in the use of ACT products. KRS 158.6453 mandates that Kentucky’s public school students participate in the Educational Planning and Assessment System (EPAS) from ACT (Kentucky
Legislative Research Commission, 2009). The state assesses public school eighth-graders using the EXPLORE test, public school 10th-graders with the pre-ACT (PLAN) test, and public school 11th-graders primarily through the ACT (Combs, personal communication, November 19, 2009).

In an ACT study entitled “Using PLAN to Identify Student Readiness for Advanced Courses in High School,” ACT compared the scores of students on the PLAN test with scores on selected advanced placement (AP) exams. The selected AP exams assessed mastery of the material covered in the corresponding ACT course. In 1999 and 2002, a total of 2,589 student records across seven AP exams were studied (ACT, 2005c, p. 1). The hypothesis was that there would be a strong correlation between the PLAN test and the test’s ability to predict success on the AP exams. The results proved the hypothesis. Using the PLAN composite score resulted in correct predictions for 69% in European History, 84% in American Government, 75% for Calculus, and 79–80% for English Language/English Literature. The study concluded that administering the ACT PLAN to 10th-grade students gave high schools information on students who would benefit the most from advanced placement, dual-enrollment, and other high-score level courses (ACT, 2005c).

ACT furthered its studies of how to determine which students would be successful in college by researching the possible benefits of following a high school core curriculum. ACT recommends a core curriculum of 4 years of English and 3 years each of mathematics, science, and social studies in order to be successful in college (ACT, 2005a, p. 1). In ACT’s 2005 study “Benefits of a High School Core Curriculum,” the 2005 graduating class of 1.2 million students was examined with 56% taking the core
curriculum and 34% taking less than the core curriculum (ACT, 2005a, p. 1). These totals do not sum to 100% as not all students in the study reported their course-taking information. Findings of the study included the following (ACT, Inc., 2005a):

- Students who took the core curriculum scored between 1.6 and 2.8 points higher on the ACT Composite than those who did not.
- Students who took the recommended core curriculum enrolled in college at a higher rate than those who did not regardless of race, family income, or gender.
- Students who took the recommended core curriculum were less likely to enroll in developmental/remedial courses in college regardless of race, family income, or gender.
- Students who took the recommended core curriculum earned higher first-year college grade point averages than those who did not regardless of race, family income, or gender.

In the core curriculum study, ACT examined WorkKeys. The curriculum study found that students who took the core curriculum in high school achieved higher WorkKeys scores in two of the identified foundational areas, applied mathematics, and reading for information (ACT, 2005a). This study did not acknowledge any limitations.

ACT, Inc.’s most in-depth study utilizing WorkKeys as an indicator of college and workforce success was Ready for College and Ready for Work: Same or Different? ACT came to the conclusion that high school graduates need the same readiness score level in reading and mathematics in order to succeed in college level courses without remediation and to successfully enter workforce training programs, both of which are
offered at community and technical colleges (ACT, 2006b). This ACT study identified the score level of reading and mathematics skills students need to be ready for entry-score level jobs that require less than a bachelor’s degree but still support a family and offer career advancement. The study then compared student performance on ACT tests that measure workforce readiness (WorkKeys) with those that measure college readiness (the ACT college entrance exam) and determined that the score levels needed for workforce readiness and college level readiness were the same (ACT, 2006b). The assessments examined in WorkKeys were Reading for information and Applied mathematics. The scores deemed necessary to be successful and comparable to the ACT exam were a score level 5 in each area (ACT, 2006b, p. 3). The study summarized that educators should be educating all high school students in the same manner, regardless of whether preparing them for postsecondary education or the workforce (ACT, 2006b, p. 8).

ACT developed college readiness benchmarks in English, mathematics, science, and reading. Research findings indicated students meeting these benchmarks would have a high probability of earning a C grade or higher in certain credit-bearing first-year college courses. The benchmark scores were 18 in English, 22 in Mathematics, 21 in Reading, and 24 in Science (ACT, 2005d, p. 1). No evidence in the literature review was found that ACT has specifically identified WorkKeys benchmark scores for first-year college success. Furthermore, as confirmed by ACT Industrial Psychologist H. Palmer, in December 2008, no WorkKeys benchmark scores for first-year college success existed (Palmer, personal communication, December 12, 2008).

Similar to the rest of the nation, Kentucky’s statistics for college readiness were unsatisfactory: 46% of Kentucky juniors in 2008 met the ACT college success
benchmark in English, 20% in mathematics, 33% in reading, and 15% in science (Kentucky Department of Education, 2008). Only 13 Kentucky high school graduates in 2009 scored a 36 on the ACT, the maximum ACT score that can be achieved (ACT, 2009a). However, from 2008 to 2009, there was slight improvement. As measured by ACT, the percentage of nationwide ACT-tested high school graduates ready to earn a C or better in college level courses increased slightly from 22% in 2008 to 23% in 2009 (ACT, 2009b).

Products such as ACT’s QualityCore focus on improving instructional methods to ensure that the curricula of high schools are aligned with the needed skills for students entering postsecondary institutions. Numerous states have also formed local P–16 councils to ensure curricula alignment (Daley, personal communication, November 1, 2009). Other recently developed ACT products include a pre-WorkKeys test to determine if students are ready to take the assessments as well as personal skills tests to determine job/personality matches. All of these tools are beginning to be used in public high schools around the nation.

**Other Career-Related Assessment Tools**

Literature indicates that numerous other career- and workforce-related assessment tools exist. Other career-related assessment tools include but are not limited to the following: Adult Measure of Essential Skills (AMES), Assessments in Career Education (ACE), SkillsUSA Championships, National Occupational Competency Testing Institute (NOCTI), and Michigan Employability Skills Assessment Kit (ESAK). A breakdown of WorkKeys, the aforementioned assessments, and others were noted in a study conducted
by the Office of Educational Research and Development. This study displayed the information in a table with each test’s content reliability and validity. The study documented that WorkKeys assessments have been tested for non-bias in racial, ethnic, and gender groups and that statistical analysis had been conducted by ACT to ensure the non-bias (U.S. Department of Education, 1999).

**Training Curriculum for WorkKeys**

With all of the national attention on WorkKeys, several vendors developed tools to assist in improving WorkKeys scores. KeyTrain was the first computer-based training available that was specifically designed for WorkKeys, available both online and in CD format (KeyTrain, n.d.c). Worldwide Interactive Network developed the WIN solution, which is a series of 36 score levels of competency-based instruction designed for all nine WorkKeys skill areas (WIN, n.d.). The system is available via Internet, in CD format, and in workbooks. Both products can be used in the classroom to enhance student–teacher interactive activities but are more self-study, self-paced types of systems. There are notable documented successes involving each product.

One case study that showed the effectiveness of KeyTrain being used in the educational arena as a WorkKeys training tool was with Chicago Public Schools. This school system implemented reading for information and applied mathematics WorkKeys assessments with KeyTrain remediation successfully in their high schools (ACT, 2006c). Another case that suggested the effectiveness of KeyTrain in remediation for improved WorkKeys scores looked at at-risk students preparing for the Georgia high school
graduation test. According to the school’s principal, 90% of students are now using KeyTrain with 92% receiving a Georgia Work Ready Certificate (KeyTrain, n.d.a).

The WIN remedial product was used successfully with AIMS Community College to assist in the remediation of its at-risk students after assessing them with the WorkKeys assessments. According to Chasteen and Harmon (2008), the WIN program at AIMS served 200 students with over 800 on the waiting list.

The Oklahoma and Chicago public school systems are heavily vested in KeyTrain. In Oklahoma, 78% of KeyTrain users increased at least one score level in WorkKeys with 94% of KeyTrain users scoring a level 4 or above in all three foundational areas—Reading for information, Applied mathematics, and Locating Information—and 50% with a level 5 score or above (KeyTrain, n.d.b).

ACT, Inc. has developed its own system for assisting with WorkKeys scores: Targets for Instruction. The WorkKeys Targets for Instruction books give instructors suggested activities, materials, and techniques to implement in the classroom to help teach the skills and improve scores. Targets for Instruction differ from the KeyTrain and WIN products because it involves activities in the classroom versus the students working on their own. There are targets for instruction books for all nine WorkKeys skills assessments (ACT, n.d.h).

Correlations have been made to WorkKeys and Steck Vaughn books and learning resources (Steck Vaughn, n.d), which have led to some individuals utilizing the Steck Vaughn books and resources when studying to improve WorkKeys scores. PLATO learning system is another system that claims that its company’s computerized curriculum can improve WorkKeys scores (Business Wire, 2000).
WorkKeys and Business and Industry

Countless companies, both large and small, utilize WorkKeys for hiring and/or promotion decisions. Noted companies include Energizer, Dow Chemical, Solo Cup, Clopay Plastics, Mitsubishi Electric, Weyerhaeuser, Polaris, Wausau Paper, and A.O. Smith Electric. The New Jersey State AFL–CIO union uses WorkKeys to transition youth to apprenticeship programs to work (ACT, 2006d).

Bavarian Motor Works (BMW) of North America, LLC relies on results from two of the WorkKeys assessments, reading for information and applied technology, to determine if job candidates are qualified for the highly skilled areas and positions that need to be filled (ACT, 2009c). Numerous companies utilize WorkKeys scores for hiring and promotion, such as Nestle, Mitsubishi, and so forth. ACT-certified job profilers conduct Equal Employment Opportunity Commission (EEOC) compliant job profiles to determine the correct WorkKeys score levels necessary for positions at each specific company (Taylor, personal communication, September 15, 2009).

The West Michigan Strategic Alliance and the Workforce Innovations in Regional Economic Development (WIRED) endorsed a testing plan based on the WorkKeys National Career Readiness Certificate (NCRC) with 203 companies and 35,000 employees already requesting or requiring the NCRC as a condition for employment (West Michigan Strategic Alliance, 2008). Bill Guest, president and managing director of Metrics Reporting Inc., is involved with the West Michigan Strategic Alliance project. He stated that one strong advantage to the project is the fact that the NCRC is based on WorkKeys assessments which have already been proven to be valid and reliable, as well as aligned with employer needs.
Horizon House, a Philadelphia social service agency for adults with psychiatric disabilities, drug and alcohol problems, and retardation, implemented the WorkKeys assessments for its employees (ACT, 2006e). It also profiled positions and found that teamwork, listening, and documenting were very important skills Horizon House employees needed. ACT recommends specific job profiles for companies that make hiring and promotional decisions based on WorkKeys assessment scores to address any possible EEOC compliance issues. Employees of Horizon House participated in the WorkKeys Targets for Instruction activities in Teamwork and virtually all participants increased skills as a result (ACT, 2006e).

To combat the Commonwealth of Kentucky’s statistic of 38% of adults functioning below high school reading and mathematics levels, a noted Kentucky success story was with Owensboro Community College located in West Kentucky and the Owensboro Mercy Health System, where a $250 stipend was paid by the company to anyone who moved his or her WorkKeys scores up to at least a Score level 4 (ACT, 2007a). A concerted effort in the city of Owensboro and the city’s workforce investment agency resulted in the majority of the Owensboro workforce being assessed in WorkKeys. A database was created to house the scores so that future employers could view the quality of the Owensboro workforce (ACT, 2007a).

**No Child Left Behind Act and WorkKeys**

The No Child Left Behind Act (NCLB) of 2002 focuses on outcomes-based education, including setting high standards and setting measurable goals in order to improve individual learning outcomes. NCLB requires states to develop assessments in
basic skills to be given to all students in certain grades in order to receive federal funding, and it allows achievement standards and types of assessments to be set by each state (U.S. Department of Education, n.d.b).

The No Child Left Behind Act has led to an increased number of high schools focusing on WorkKeys and using the assessments to determine if a student is ready to transition from education into the workplace. In Kentucky, for example, all high school seniors must take either the ACT or the WorkKeys assessment before graduating. Other schools have imposed similar requirements. The State of Illinois has the Prairie State Assessment, which combines WorkKeys Applied mathematics and Reading for information with the ACT college assessment (Wells, 2006).

**WorkKeys in Secondary Institutions**

Studies existed discussing the WorkKeys assessment product and the possible wide-scale implementation in secondary and postsecondary education. A study sponsored by the state of Ohio’s P–16 Council found that use of the WorkKeys assessments could be helpful in that the instrument included practical, vocational-type questions. Per the study, secondary school districts in Topeka, KS, and Louisville, KY, made WorkKeys a requirement for high school graduation (Rochford, 2004).

The Lake Cumberland Area Development District (LCADD), which serves primarily to promote economic development and well-being in a ten county area in Kentucky, finances the WorkKeys testing of all seniors in their local areas. Seventeen of the 20 high schools participate, and over 2,500 seniors test each year. According to LCADD Executive Director McGaha, “The number receiving gold or silver Kentucky
Employability Certificates has increased each of the 3 years the tests have been given, up to 62.9% in the ‘07–‘08 school year” (McGaha, personal communication, January 11, 2009).

South Carolina offers free online WorkKeys assessments to South Carolina 9th-through 11th-graders. The WorkKeys assessments of reading for information, applied mathematics, locating information, and applied technology are available online (Ryan, 2006).

In another example, Chickasha High School implemented a career readiness certificate. One hundred thirty-one high school seniors were assessed with WorkKeys with 28 earning bronze certificates for score level 3, 74 earning silver for WorkKeys Score level 4, and 23 earning gold for score level 5 (ACT, n.d.d). The assessments utilized with the certificate were reading for information, locating information, and applied mathematics.

In a study by ACT, Inc., researchers looked at the State of Illinois, which requires 11th-graders to take WorkKeys reading for information and applied mathematics assessments. Based on the ACT exam college readiness benchmarks, the study found the skills and WorkKeys scores for technical jobs of electrician, plumber, and so forth necessary to support a family of four were similar to the norm required for a successful first year in college (Dewitte, 2006). ACT Executive Officer Ferguson stated, “We can’t afford to have one expectation for students who plan to attend college and another for those who plan to enter the workforce or workforce training programs after high school” (Dewitte, 2006, para. 2).
Another secondary institution WorkKeys example involves a community college using WorkKeys to assist identified at-risk high school students. Aims Community College in Greeley, CO, utilized all nine WorkKeys assessments with the identified at-risk high school students and then customized training for each student (ACT, 2009e).

Harmon, director of the diploma program in Greeley, CO, stated that “A lot of people like the community where they’re born and raised and would stay here given the opportunity. Providing those students with employability skills allows them to stay” (ACT, 2009e, para. 5). The diploma program is a success story involving Aims Community College in Greeley, CO, partnering with the local high school where the high school students must achieve certain scores in order to graduate (ACT, 2009e).

**WorkKeys in Community and Technical Colleges**

As businesses nationwide begin to use WorkKeys as a common language for hiring and promotion, students who have taken the assessments have an advantage. Hutchinson Community College uses WorkKeys and offers the reading for information and applied mathematics assessments upon entry into 14 degree and 10 certificate programs (ACT, 2009d). WorkKeys has also been used by colleges to assist with the determination of entry into job-training programs by displaced workers (Davis, personal communication, October, 20, 2009).

Albuquerque Technical Vocational Institute offers a comprehensive approach utilizing WorkKeys in which all testing is computerized. Although testing is not mandated, students are encouraged to test and receive their official WorkKeys score
reports. If scores are low, they are encouraged to utilize KeyTrain materials to improve their scores (Central New Mexico Community College, n.d.).

Literature related to the study confirmed that numerous community and technical colleges were administering the WorkKeys assessments, but in some cases the assessments were used for business and industry and not for the college’s own students. However, Northeast Kansas Technical Center utilized WorkKeys reading for information and applied mathematics assessments for all students seeking admission, and the college determined score levels for each program area that students were expected to score (Northeast Kansas Technical Center, n.d.).

According to its Web site, Wallace State Community College, located in Hancesville, AL, also required students in selected technical program areas to complete WorkKeys assessments prior to graduation (Wallace State Community College, n.d.). Students test in the areas of applied mathematics, locating information, and reading for information.

West Virginia advocated the use of WorkKeys based on the successful scores of community and technical college students. Skidmore, Chancellor of the West Virginia Council for Community and Technical College Education, stated, “There is a gap in West Virginia in moving toward the new economy” (“W.Va. Council Urges Reduction,” 2004, para. 4). Skidmore noted that community and technical college graduates score much better on the WorkKeys assessment than the overall population of West Virginia and so are more employable (“W.Va. Council Urges Reduction”).

Although possibly somewhat anecdotal, there was one record of success found regarding an individual grade point average being linked to high WorkKeys assessment
scores with a community and technical college student using WorkKeys. With the Northop Grumman Ship Systems in Pascagoula, MS, a noted welder at the company had her skills assessed in WorkKeys reading for information, applied mathematics, and observation and scored well (ACT, 2006f). Her grade point average at the local community and technical college was noted as being high.

History of WorkKeys in the Kentucky Community and Technical College System (KCTCS)

Technical schools across the U.S. receive some of their funding for equipment and other necessities from the Carl D. Perkins Vocational and Technical Education Act, which was first authorized in 1984 and reauthorized in 1998. The act aims to increase the quality of technical education within the U.S. by providing almost $1.3 billion in federal support for career and technical education programs in all 50 states. The law extends through 2012 (U.S.Department of Education, n.d.a). There has been a major concentration in the use of WorkKeys in Kentucky technical programs as a way to show accountability for each school’s Perkins Act requirement.

Initially, KCTCS performed specific program area job profiles conducted by certified ACT job profilers and determined desired test score levels in specific identified areas for each skill, such as observation for welding programs. Later, the decision was made to correlate the testing with the WorkKeys National Career Readiness Certificate and the Kentucky Employability Certificate (KEC) and move the testing for all technical program areas to reading for information, applied mathematics, and locating information.

ACT’s national career readiness certificate (NCRC) measures workforce readiness. Students who score at least a level 3 in applied mathematics, reading for
information, and locating information earn a bronze certificate which means they have the skills for 35% of jobs in the WorkKeys Occupational Profile database. Students who score at least a level 4 in each of the three WorkKeys areas receive a silver certificate which means they have the skills necessary for 65% of jobs in the WorkKeys Occupational Profile database. Students scoring at least a level 5 in each area earn a gold certificate which means they could qualify for 90% of the jobs in the WorkKeys Occupational Profile database and finally, students scoring at least a level 6 in each area earn a platinum certificate, which indicates they have the skills necessary for 99% of jobs in the WorkKeys Occupational Profile database (ACT, n.d.e). As stated on the ACT Web site, 405,864 NCRC certificates have been awarded in the U.S. with 1,447 platinum; 85,832 gold; 210,190 silver; and 108,395 bronze (ACT, 2009f). The WorkKeys Occupational Profile database is a compilation of WorkKeys job profiles that have been conducted and generalizations that can be made regarding required WorkKeys score levels and occupations that correspond with O’NET, a nationwide occupational network database.

In addition to the NCRC, several states developed their own career readiness certificates, such as the Kentucky Employability Certificate (KEC), which has similar measures and is signed by the governor for student achievers. Community and technical colleges in Kentucky have the option to grant the certificate to those students who achieve the appropriate WorkKeys score level scores. The charge is $10 per certificate, currently paid by the school or the student, depending on the institution.
Chapter Summary

The literature review provided data regarding WorkKeys and case study examples of WorkKeys use with business and industry as well as secondary and postsecondary institutions, namely public high schools. Although a few research projects examined differences in gender, race, and age in comparison to WorkKeys assessments, none were found that examined WorkKeys assessment score levels and correlations to grades or grade point averages within community and technical colleges.
CHAPTER III
METHODOLOGY/RESEARCH DESIGN

Chapter Overview

The purpose of this chapter is to present the research design, data collection, and data procedures implemented in the study. The methodology used in the study is for existing data utilizing the Pearson $r$ correlation coefficient and $t$-tests.

Research Design and Rationale

The type of research conducted in this study is an ex post facto non-experimental quantitative correlational research design. The study utilizes existing data consisting of WorkKeys scores, grades, and grade point averages. The data utilized were collected from 4 years of WorkKeys scores housed in the WorkKeys Scoring Center Expressscore database in Hazard, Kentucky, as well as 4 years in PeopleSoft. The years selected for review included 2005 through 2008. The time period of fall 2005 through spring 2008 was selected in order to allow time for students to have taken the WorkKeys and to have enrolled in college level reading, mathematics and other college level courses and to have earned letter grades in those courses. No differentiation was made between students who took the exam in 2005 versus students who took the exam in 2006, 2007, or 2008. The researcher looked at the fact that students took the exam upon college entrance and then
enrolled in and completed a college level reading, mathematics or other college level course as identified in the study.

In correlational research, predictor and criterion variables take the place of independent and dependent variables (Fraenkel & Wallen, 2006, p. 366). The predictor variable in the study is the individual student scores on the WorkKeys assessments of reading for information, applied mathematics, and locating information. The criterion variables are the grades in the students’ college level reading classes as identified and the grades in the students’ college level mathematics classes as identified, as well as grades in the other courses as identified in the study. For the analysis of cumulative grade point average compared to WorkKeys scores, the grade point average is the criterion variable and the WorkKeys assessment scores in reading for information and applied mathematics were the predictor variables. Grades in college level reading and mathematics classes were chosen to determine if relationships existed with the reading for information and applied mathematics WorkKeys scores because these classes were required for Associate in Applied Science graduation. For the purposes of this research, college level mathematics was defined as college algebra, applied mathematics, calculus, or trigonometry. College level reading courses were defined as History 108, History 109, introduction to literature, and introduction to psychology. The research study does not include scores on any developmental courses available at the community and technical colleges.

Grades from other technical related program courses were not chosen to compare with the reading for information and applied mathematics scores because too many varying levels of reading and mathematics are used in those types of classes, making it
difficult to determine if a correlation existed. With the WorkKeys locating information assessment, grades from other college classes were selected to determine if relationships existed between the WorkKeys scores and grades in the classes. The other college level classes included introduction to computers, art, communications, physics, and blueprint reading. Courses examined were all 100 level or entry level college reading, mathematics, and other courses and grades of C or higher were reviewed as they are considered successful and transferable at the community and technical college level.

WorkKeys scores examined for correlations in the research included levels 3 through 7 scores in applied mathematics and reading for information. The WorkKeys locating information assessment goes to a score level 6 only and therefore, score levels 3 through 6 were analyzed when comparing grades with locating information to determine relationships. Anything below a score level 3 in WorkKeys is considered unsuccessful for the purposes of the study because it is below the lowest WorkKeys score level and not certificate-score level worthy. Certificates are awarded by ACT and other state institutions only at score level 3 or higher (ACT, n.d.e). In the analysis of healthcare and non-healthcare declared majors and WorkKeys assessments grades, reading for information and applied mathematics scores of score levels 5 – 7 were used. These are the higher score levels of WorkKeys. When examining the applied mathematics scores of males and females who took a college level math course, score levels 5–7 in applied mathematics were also used. For these questions, the research eliminated the lower score level scores of 3 and 4. While these scores are considered passing by WorkKeys standards, they are not considered college or work ready as deemed by ACT’s 2005 study, Ready for College and Ready for Work: Same or Different? (ACT, 2006b). The
ACT 2005 study determined that a score level 5 in WorkKeys applied mathematics and reading for information corresponded with the ACT scores to be successful in college and in the workplace (ACT, 2006b, p. 3). Score Level 5 and higher in reading for information was also examined more closely due to the correlations that have been made between the assessment and actual grade level equivalents. Per ACT, a score level 5 in WorkKeys reading for information means that a person can read at an 11th-grade score level. Score level 6 in reading for information is college level, and score level 7 in reading for information is graduate score level (ACT, 2006a, p. 3). WorkKeys reading for information is the only WorkKeys assessment that has been correlated to grade levels.

When examining grade point averages, cumulative grade point averages were retrieved on each student out of PeopleSoft software as utilized by KCTCS as a student information processing system. Students’ grade point averages were then matched to WorkKeys scores in reading for information, applied mathematics, and locating information.

**Participants and Site**

An application to conduct the study was submitted and approved by the Internal Review Board for the Protection of Human Subjects of Mississippi State University. WorkKeys assessment scores in reading for information, applied mathematics, and locating information were viewed for each of the students as well as the students’ cumulative grade point averages, program areas, and grades in enrolled college level reading and mathematics courses. The students involved in the study were enrolled in certificate, diploma, and 2-year associate’s degree technical programs at one of the
colleges involved in the study. Technical programs were chosen because of the WorkKeys’ use as a predictor for work-ready and workforce training programs. The technical students were assessed in WorkKeys by the KCTCS system in order to meet Carl D. Perkins accountability measures for the technical programs. The students took the assessments when they began their technical degree programs of study at a designated location and time as designated by their colleges. Associate in Arts and Associate in Science programs were not chosen because these students are normally on a transfer track and not a workforce or technical track. The ACT exam is also the primary exam used to measure the college readiness of students enrolled in the Associate in Arts and Associate in Science programs. Data on students from the following colleges were included in the study:

- Hazard Community and Technical College
- Southeast Kentucky Community and Technical College
- Bluegrass Community and Technical College
- Maysville Community and Technical College
- Big Sandy Community and Technical College
- Somerset Community College
- Ashland Community and Technical College

As displayed in Appendix D, college presidents whose colleges were involved in the study submitted letters to the researcher providing permission to utilize their colleges’ student data. As displayed in Appendices B and C, the KCTCS and ACT also granted permission for the study. Mississippi State University’s Institutional Review Board’s permission was granted as displayed in Appendix A.
The fact that the community and technical colleges have open entry/open access with a variety of program options available allows for a good mixture of gender and race. The community and technical colleges also enroll people of all ages in all programs, allowing for a good random sample. A computer program was used for random assignment of student data in the study by pulling a report of all students in the technical programs that were assessed in WorkKeys. The number selected for the study was based on the number of students enrolled in the participating college’s technical programs. Utilizing Roscoe’s Rule of Thumb, 10% of the group was a total suggested sample size (Fraenkel & Wallen, 2006, p. 94). Because this study is correlational, the sample size had to be a minimum of 30. It was determined that 9,755 students were enrolled in Associate in Applied Science or technical degree, diploma and certificate programs in the colleges selected for the study. This research used 3,304 student records. This is a 34% sample size, which is acceptable for educational research. The sample was representative of gender with 46% female (n = 1,530), 52% male (n = 1,734), and 2% undesignated (n = 40). The WorkKeys reading for information assessment sample of score level 3 and higher that was analyzed included 2,609 records, the WorkKeys applied mathematics assessment sample of score level 3 and higher included 2,113 records and the WorkKeys locating information assessment sample of score level 3 and higher analyzed included 2,250 records. The sample was also indiscriminate and representative of all technical non-healthcare program majors within the colleges, including aviation maintenance, diesel, carpentry, heavy equipment, mining, computer-aided drafting, industrial maintenance, cosmetology, office technology, business administration, information technology, and so forth as well as all technical healthcare program majors including
nursing, radiography, surgical tech, clinical lab technician, physical therapy assistant, and respiratory care.

Further, the data analysis of those students who scored a level 5 and above in WorkKeys in reading for information and applied mathematics assessments were used with corresponding grades in the college level courses. A total of 1,713 reading for information records and 1,172 applied mathematics records were selected for correlation computations. Analysis of locating information at a level 5 and higher was not conducted. This was based on the number of students who had taken at least one of the WorkKeys assessments and scored at level 5 or above. In the research performed on the cumulative grade point averages versus WorkKeys scores, 2,185 records were retrieved and analyzed out of the original sample of 3,304. These were chosen because they had a cumulative grade point average calculated in PeopleSoft. Not all of the 3,304 records in the original sample had cumulative grade point averages calculated in PeopleSoft and therefore could not be used in the WorkKeys assessment scores and cumulative grade point averages comparisons.

**Instrumentation/Data Collection**

Existing data were used from the WorkKeys assessment instruments of reading for information, applied mathematics, and locating information. The scores on each assessment were reviewed: score levels 3–7 for reading for information, score levels 3–7 in applied mathematics, and score levels 3–6 in locating information. In addition, existing grades in the students’ college level reading and mathematics courses were used in the study. The standard measure of 0.00–4.00 was used for each student in regard to his or
her cumulative grade point average. Actual grades of the students college level coursework of A, B, C, D and E were recorded and then mathematically coded on a ranked order scale, as A = 5, B = 4, C = 3, D = 2, E = 1 in order for the analysis to be performed properly. Any blanks noted in regard to no test taken or no reading, mathematics, or other classes taken were removed in the computations so as not to skew the data.

No WorkKeys assessments given during fall of 2008 or spring of 2009 were considered as the study was based on the prior 4 years of existing data. The KCTCS college students’ scores in this study were the result of paper and pencil versions of the WorkKeys assessments. There are computerized assessment tools available in reading for information, applied mathematics, locating information, and applied technology. The decision to not use the computerized versions was made due to the lack of computer lab availability in many of the college locations. There was no preferential treatment, study guides, or aides of any kind given to the students prior to their WorkKeys assessments.

The WorkKeys assessments were developed by ACT, a national assessment organization. Content reliability has been addressed by ACT. As per the WorkKeys Assessments Technical Bulletin, the Kidder Richardson coefficient of reliability or KR 20 was determined for the two existing forms for the reading for information assessment. Coefficient of reliability was determined to be .87 and .90 respectively (ACT, 2007b). The KR 20 for the two forms of the applied mathematics assessments were.92. Both the reading for information and the applied mathematics WorkKeys exams have 30-items and per the WorkKeys Assessments Technical Bulletin, the KR 20 values determined were exceptionally high for a 30-item test (ACT, 2007b).
The WorkKeys locating information assessment has 32 items and the KR 20 for the three locating information forms was .70, .83, and .79 respectively (ACT, 2007b). The Kidder Richardson scale measures the consistency in which subjects respond to the question and is an indicator of reliability for various types of tests, including standardized tests (University of Connecticut, n.d.).

**Procedure**

Although WorkKeys includes testing in nine subject areas, reading for information, applied mathematics, and locating information were chosen for the purposes of this study. These three were selected because ACT has developed a National Career Readiness Certificate based on these three assessments. There is also a Kentucky Employability Certificate centered on these three assessments, and this study is being conducted in the Commonwealth of Kentucky. There may be students who have WorkKeys scores in areas other than reading for information, applied mathematics, and locating information. However, those scores were not viewed for the purposes of this study.

After random selection of the students whose scores, grades, and grade point averages would be used was completed, the researcher retrieved existing data from the KCTCS’s PeopleSoft student database where all standardized test scores, grade point averages, and class grades are kept. The researcher also pulled the WorkKeys scores from the WorkKeys Expressscore database housed at the Hazard Campus of Hazard Community and Technical College. WorkKeys scores from seven of the 16 colleges within the KCTCS are housed in Hazard, KY. After retrieving the data and inputting the
data into Microsoft Excel, the researcher determined if any correlations or relationships existed.

Data Analysis/Measures

A major component of the research was the Pearson correlation. A Pearson $r$ value was determined for each research question where WorkKeys scores and grades were examined to determine if significant relationships existed. The researcher looked for an $r$ value of .40 to .60 to determine if moderate relationships existed between the WorkKeys predictor values and the criterion values of the grades in classes, as well as the cumulative grade point averages. Any values below .40 were considered as showing little to no relationship. Values greater than .50 indicated a stronger relationship. A coefficient of determination or $r^2$ was also calculated for each relationship of WorkKeys scores and grades to determine the related variance shared by the variables. The $r^2$ displays as a percentage value. A $p$-value was also examined in each correlation to assist with determining strength of significance regarding the relationship. Any $p$-values greater than .05 were considered to show weak significance while $p$-values less than .05 were considered to show strong significance.

A two-sample $t$-test was used for research question 9 where the researcher was attempting to determine if healthcare declared majors scored higher in the WorkKeys assessment of reading for information and applied mathematics than non-healthcare majors. The two-sample $t$-test was also utilized with research question ten where the researcher examined if males within the sample size scored higher than females within the sample in the WorkKeys applied mathematics assessment. For the $t$-tests the
researcher examined the differences in the means between the two groups to determine if there was a significant difference. Effect size was calculated and considered as well to determine magnitude of the strength of the relationship.

**Ethical and Legal Considerations**

There was no direct personal contact with any of the students whose scores, course grades, or grade point averages were involved in the study. The computerized selection and no use of student identifying information protected the student identity as well. Permission was given by each college president to use the data for research purposes.

**Research Timetable and Implementation**

The research required the approval of the presidents of the colleges involved. Primary costs of the research were confined to postage of the letters requesting approval from the presidents. The KCTCS Internal Review Board also approved the research study. Upon approval by MSU’s Institutional Review Board, the research, data collection, analysis, and findings were performed during spring 2009.

**Chapter Summary**

The methodology chapter presented how the data used in the study were retrieved and analyzed as well as the timetable of the research implementation. Ethical and legal considerations were discussed and possible study limitations reviewed.
CHAPTER IV
DATA ANALYSIS AND FINDINGS

Purpose

The purpose of this chapter is to provide the findings of this quantitative research study that used existing data. Research questions and statistical results are discussed. Detailed information on statistics and results are given.

Analysis

A variety of statistical testing was performed in order to answer the research questions. The Pearson $r$ correlation and correlation of coefficient or $r^2$ were calculated to determine existence and strength of relationships with community and technical college students’ WorkKeys reading for information, applied mathematics and locating information scores and college level reading, mathematics and other courses’ grades. The Pearson $r$ correlation and correlation of coefficient or $r^2$ were also calculated to determine existence and strength of relationships with community and technical college students’ WorkKeys reading for information and applied mathematics scores and cumulative grade point averages. An independent two-sample $t$-test was performed to determine if there were a significant difference between the means of the healthcare majors and non-healthcare majors WorkKeys reading for information and applied mathematics assessment scores. An independent two-sample $t$-test was also conducted to determine if
there was a significant difference in the means of scores for males and females and their WorkKeys applied mathematics scores.

**Research Questions Findings**

*Research Question 1*

1. Is there a relationship between students’ scores of level 3 or higher in the WorkKeys assessment of applied mathematics and grades of C or higher in the first college level mathematics course in which the students were enrolled at the community and technical college?

After entering and matching all students’ WorkKeys applied mathematics assessment scores and their college level mathematics course grades, which for purposes of the study were determined as being either college algebra, calculus, trigonometry, or applied mathematics depending on program major requirements, it was determined that the Pearson correlation of student grades in their college level math courses and the WorkKeys applied mathematics = .087. The results indicated a weak relationship between a score of level 3 and higher on the applied mathematics WorkKeys assessment and a grade of C or higher in the first college level mathematics course in which students were enrolled. Results are summarized in the table below.
Table 1
Correlation Results of WorkKeys Applied Mathematics Level 3 Scores and Higher and College Level Mathematics Course Grades of C or Higher

<table>
<thead>
<tr>
<th></th>
<th>N or sample size</th>
<th>Pearson correlation (r)</th>
<th>Coefficient of determination (r²)</th>
<th>p-value or Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WorkKeys applied</td>
<td>2,113</td>
<td>.087</td>
<td>.007</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>mathematics assessments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>level 3 scores and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>higher</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .05

Finding a Pearson $r = .087$ from the sample size of 2,113 student records, the research showed that there was little correlation between students who scored a level 3 or higher in the WorkKeys assessment of applied mathematics and achieved a grade of C or better in their college level mathematics course as defined by the researcher. Results were not significant. The $r^2$ of .007 shows that less than 1% of the college level mathematics course grades of C or better can be predicted from the relationship to the WorkKeys applied mathematics score. The $p$-value determination of <.001 showed significance within the sample that the evidence supported the weak relationship.

Research Question 2

2. Is there a relationship between students’ scores of level 3 or higher in the WorkKeys assessment of reading for information and grades of C or higher in the first college level reading course in which they are enrolled at the community and technical college?
After entering and matching all students’ WorkKeys reading for information assessment scores and their college level reading courses and grades, which for purposes of the study were determined as being either History 108 or 109 or Psychology 100, it was determined that the Pearson correlation of student grades in their college level reading courses and reading for information WorkKeys score = .164. The results showed a relationship between a level 3 scores or better on WorkKeys reading for information and grades of C or better in the first college level reading course in which the students were enrolled. Results are summarized in the table below.

Table 2
Correlation Results of WorkKeys Reading for Information Level 3 Scores and Higher and College Level Reading Course Grades of C or Higher

<table>
<thead>
<tr>
<th>N or sample size</th>
<th>Pearson correlation (r)</th>
<th>Coefficient of determination (r^2)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WorkKeys reading for information assessment level 3 scores and higher</td>
<td>2,609</td>
<td>.164</td>
<td>.027</td>
</tr>
</tbody>
</table>

* p < .05

Finding a Pearson r = .164 from the sample size of 2,609 student records, the research findings showed that there was weak relationship between students scores of level 3 or higher in the WorkKeys assessments of reading for information and grades of C or better in their college level reading course as defined by the researcher. Results were significant. The r^2 of .027 shows that 2.7% of the college level reading course grades of C or better can be predicted from the relationship to the WorkKeys reading for information.
assessment score. The p-value determination of .012 was less than .05 and therefore indicated strong evidence or significance to support the weak relationship.

Research Question 3

3. Is there a relationship between students’ scores of level 5 or higher in the WorkKeys assessment of applied mathematics and grades of C or higher in the college level mathematics course in which they were enrolled at the community and technical college?

Due to ACT’s comparisons between WorkKeys level 5 score in reading for information and applied mathematics and the ACT college benchmarks for college readiness, further correlational testing was performed of WorkKeys applied mathematics of level 5 scores and higher to determine if there were a relationship between the WorkKeys scores and grades of C or better in college level reading and mathematics courses. Results were as follows:

Table 3

<table>
<thead>
<tr>
<th></th>
<th>N or sample size</th>
<th>Pearson correlation (r)</th>
<th>Coefficient of determination (r^2)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WorkKeys applied</td>
<td>1,172</td>
<td>.070</td>
<td>.005</td>
<td>.0165*</td>
</tr>
<tr>
<td>mathematics assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>level 5 scores and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>higher</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p< .05
Pearson correlation of students’ course grades and WorkKeys applied mathematics scores of level 5 or higher = .070 showing little relationship between students’ scores of level 5 or higher in WorkKeys applied mathematics and grades of C or better in their college level mathematics courses. The \( r^2 \) of .005 means that less than 1% of college level mathematics course grades of C or higher can be determined from the WorkKeys applied mathematics scores level 5 or higher. The \( p \)-value of .0165 indicates significance in the evidence of the weak relationship.

**Research Question 4**

4. Is there a relationship between students’ scores of level 5 or higher in the WorkKeys assessment of reading for information and grades of C or higher in the college level reading class in which they are enrolled at the community and technical college?

Due to ACT’s comparisons between WorkKeys level 5 scores in reading for information and applied mathematics and the ACT college benchmarks for college readiness, further correlational testing was performed of WorkKeys reading for information of score level 5 and higher. The purpose was to determine if there was a relationship between the scores and grades of C or better in college level reading and mathematics courses. Results were as follows.
### Table 4
Correlation Results of WorkKeys Reading for Information Assessment Level 5 Scores and Higher and College Level Reading Course Grades of C or Higher

<table>
<thead>
<tr>
<th>N or sample size</th>
<th>Pearson correlation (r)</th>
<th>Coefficient of determination ($r^2$)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WorkKeys reading for information assessment level 5 scores and higher</td>
<td>1,713</td>
<td>.109</td>
<td>.012</td>
</tr>
</tbody>
</table>

* $p < .05$

With a Pearson $r = .109$, the research showed that there was weak relationship between students’ scores of level 5 or higher in the WorkKeys assessment of reading for information and grades of C or better in the students’ college level reading courses as defined by the researcher. The $r^2$ of .012 means that 1.2% of college level reading course grades of C or higher can be determined from the WorkKeys reading for information scores of level 5 or higher. The $p$-value of .013 shows significance in the evidence of the weak relationship.

**Research Question 5**

5. Is there a relationship between students’ scores of level 3 or higher in the WorkKeys assessment of locating information and grades of C or higher in their other college level courses within the community and technical college as identified in the study?

After entering and matching all students’ WorkKeys locating information assessment scores and their associated grades in other college level courses, which for
purposes of the study were determined as being either introduction to computers, physics, art, blueprint reading, or communications, it was determined that the Pearson correlation of student grades in their college-level courses and the WorkKeys locating information scores = .135. The results indicated weak relationship between the level 3 scores or higher in the WorkKeys locating information assessment and grades of C or higher in the associated college level courses in which the students were enrolled. Results are summarized in the table below.

Table 5

<table>
<thead>
<tr>
<th>WorkKeys locating information assessment Level 5 scores and higher</th>
<th>$N$ or sample size</th>
<th>Pearson correlation ($r$)</th>
<th>Coefficient of determination ($r^2$)</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,250</td>
<td>.135</td>
<td>.018</td>
<td>&lt;.001*</td>
<td></td>
</tr>
</tbody>
</table>

* $p < .05$

Pearson correlation of student grades and locating information WorkKeys scores of level 5 or higher = .135 showing weak relationship between students’ scores of level 3 or higher in locating information and grades of C or better in the students’ other college level courses. The $r^2$ of .018 means 1.8% of college level course grades as defined by the researcher can be determined from the relationship from the WorkKeys locating information assessment. The $p$-value of <.001 shows significance in the support of the evidence of the weak relationship.
Research Question 6

6. Is there a relationship between students’ cumulative grade point averages and WorkKeys reading for information assessment scores?

To examine the relationship of cumulative grade point average and WorkKeys reading for information assessment scores, a Pearson $r$ correlation was run. Results were as follows: Scores of level 3 and higher were used in the computation. The Pearson $r$ correlation of WorkKeys scores in reading for information and cumulative grade point averages was .206. Results are summarized in the table below.

Table 6

<table>
<thead>
<tr>
<th></th>
<th>$N$ or sample size</th>
<th>Pearson correlation ($r$)</th>
<th>Coefficient of determination ($r^2$)</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WorkKeys reading for information assessment</td>
<td>2,185</td>
<td>.206</td>
<td>.042</td>
<td>&lt;.001*</td>
</tr>
</tbody>
</table>

* $p < .05$

Per the Pearson $r$ correlation of .206, there is a weak correlation between cumulative grade point averages and score levels of WorkKeys reading for information assessments. The $r^2$ of .042 shows that 4.2% of cumulative grade point averages can be determined from the relationship from the WorkKeys reading for information assessments. The $p$-value of <.001 shows significance in the evidence of the weak relationship.
Research Question 7

7. Is there a relationship between students’ cumulative grade point averages and WorkKeys applied mathematics assessment scores?

To examine the relationship of cumulative grade point averages and WorkKeys reading for information assessment scores, a Pearson $r$ correlation was run. Results were as follows: Scores of level 3 and higher were used in the computation. Pearson $r$ correlation of WorkKeys scores in reading for information and cumulative grade point averages was .184. Results are summarized in the table below.

Table 7

<table>
<thead>
<tr>
<th></th>
<th>$N$ or sample size</th>
<th>Pearson correlation $(r)$</th>
<th>Coefficient of determination $(r^2)$</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WorkKeys applied</td>
<td>2,185</td>
<td>.184</td>
<td>.033</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>mathematics assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p < .05$

According to the Pearson $r$ correlation of .184, there is a weak relationship between cumulative grade point averages and score levels of the applied mathematics WorkKeys assessment. The $r^2$ of .033 means that 3.3% of cumulative grade point averages can be determined from the relationship from the WorkKeys applied mathematics assessments. The $p$-value of <.001 shows significant strength in the evidence of the relationship.
Research Question 8

8. Is there a difference in the mean scores in the WorkKeys reading for information assessment between healthcare and non-healthcare-declared technical majors enrolled within the KCTCS?

The researcher performed an examination of entering healthcare students within the sample versus non-healthcare students to determine if there was any difference in the mean scores of WorkKeys reading for information score levels. An independent two-sample t-test was conducted to analyze whether declared healthcare majors scored higher in the WorkKeys assessment of reading for information than declared non-healthcare majors. Results are displayed in Table 8 below.

Table 8
Results of Two Sample t-Test Comparing WorkKeys Reading for Information Assessment Mean Scores of Healthcare Majors and Non-Healthcare Declared Majors

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>M</th>
<th>CI</th>
<th>t</th>
<th>p</th>
<th>df</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare major</td>
<td>436</td>
<td>5.223</td>
<td>.95</td>
<td>8.97</td>
<td>&lt;.001*</td>
<td>754</td>
<td>.70416</td>
</tr>
<tr>
<td>Non-healthcare major</td>
<td>382</td>
<td>4.590</td>
<td>.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .05

A random sample of scores for reading for information in healthcare versus non-healthcare major was taken from the total 2,185 student records that had a declared major documented within PeopleSoft. The t-test result of 8.97 indicated a significant difference
in the scores between the two groups. The effect size determined showed a .70416 value which is a strong significance or effect in medium to large size samples which typically run from .5 to .8 (Soper, 2009). The $p$-value was determined to be $<.0001$ which also indicates a strong significance in the evidence of the relationship. Thus, there is a significant difference in the mean scores of declared healthcare majors’ scores in WorkKeys reading for information assessments and non-healthcare majors’ scores in WorkKeys reading for information.

**Research Question 9**

9. Is there a difference in the mean scores in the WorkKeys applied mathematics assessment between healthcare and non-healthcare-declared technical majors enrolled within the KCTCS?

The researcher performed an examination of entering healthcare students within the sample and non-healthcare students to determine if there was any difference in the mean scores of WorkKeys applied mathematics score levels. An independent two-sample $t$-test was conducted to analyze whether declared healthcare majors scored higher on the WorkKeys assessment of applied mathematics than declared non-healthcare majors. Results are displayed in Table 9 below.
Table 9
Results of Two Sample t-Test Comparing WorkKeys Applied Mathematics Assessment Mean Scores of Healthcare Majors and Non-Healthcare Declared Majors

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>M</th>
<th>CI</th>
<th>t-test</th>
<th>p</th>
<th>df</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare major</td>
<td>382</td>
<td>4.60</td>
<td>.95</td>
<td>-.072</td>
<td>0.471</td>
<td>570</td>
<td>0.05417</td>
</tr>
<tr>
<td>Non-healthcare major</td>
<td>288</td>
<td>4.66</td>
<td>.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .05

A random sample of scores for applied mathematics in healthcare and non-healthcare majors was taken. The t-test result of -0.72 with a p-value of .471 indicated no significant difference in the mean scores between the two groups. The effect size determined showed a .05417 value which indicates little effect in medium to large size samples which typically run from .5 to .8 (Soper, n.d.). Thus, there was no significant difference in the mean scores of healthcare majors’ in the WorkKeys applied mathematics assessment and non-healthcare majors’ WorkKeys applied mathematics mean scores.

Research Question 10

10. Is there a difference in the mean scores in the WorkKeys applied mathematics assessment between males and females enrolled within the KCTCS?

The researcher performed an examination of males and females within the sample to determine if there was any difference in their mean scores of the WorkKeys applied
mathematics assessment. An independent two-sample $t$-test was conducted to analyze whether males scored higher in the WorkKeys assessment of applied mathematics than females. Results are displayed in Table 10 below.

Table 10

<table>
<thead>
<tr>
<th></th>
<th>$N$</th>
<th>$M$</th>
<th>$CI$</th>
<th>$t$-test</th>
<th>$p$</th>
<th>$df$</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>298</td>
<td>6.167</td>
<td>.95</td>
<td>-1.08</td>
<td>.289</td>
<td>324</td>
<td>.11227</td>
</tr>
<tr>
<td>Females</td>
<td>134</td>
<td>6.211</td>
<td>.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p < .05$

A sample of scores of 298 males who scored a level 5 or higher and 134 females who scored a level 5 or higher in WorkKeys applied mathematics was taken. The $t$-value of -1.08 with a $p$-value of 0.289 indicated no significant difference in the mean scores between the two groups.

**Chapter Summary**

Research questions were answered with results of the Pearson $r$ and $t$-tests using WorkKeys scores in reading for information, locating information, and applied mathematics and entry level college courses in reading, mathematics and other courses. In summary, the $r$-values indicated weak relationships exist between WorkKeys scores in reading for information, applied mathematics, and locating information assessments and grades in the associated college level classes. The $p$-value calculations for the WorkKeys scores in reading for information, applied mathematics, and locating information
assessments and grades in associated college level classes indicated strong significance in the evidence of the weak relationships in all cases. The $r$-values showed weak relationships between WorkKeys scores in reading for information and applied mathematics assessments and cumulative grade point averages but with significant $p$-values. The relationship between WorkKeys reading for information and cumulative grade point averages was stronger than the relationship between WorkKeys applied mathematics and cumulative grade point average.

The research study also included analysis of data for healthcare and non-healthcare majors in terms of their WorkKeys assessment scores. The WorkKeys scores of applied mathematics assessment were used to determine if there were differences between the mean scores for males and females. It was determined that there was a significant difference in the WorkKeys reading for information scores but not the WorkKeys applied mathematics scores of healthcare and non-healthcare majors enrolled within the KCTCS. The statistical analysis also determined no significant difference in the WorkKeys applied mathematics mean scores of males and females scoring within the higher score levels of 5–7 who are enrolled within the KCTCS.
CHAPTER V
RECOMMENDATIONS, CONCLUSIONS AND SUMMARY

Purpose
The purpose of this chapter is to provide final recommendations, conclusions, and a summary of the research study. Generalizations and limitations are presented along with a general discussion of the research study’s findings.

Results Summary
This section highlights the major findings from the ten research questions examined. Each question is presented with the major findings beneath.

Research Question 1
Is there a relationship between students’ scores of level 3 or higher in the WorkKeys assessment of applied mathematics and grades of C or higher in the first college level mathematics course in which they are enrolled at the community and technical college?

A notable finding of the research included that with the Pearson $r$ result of $r = .087$ for students’ WorkKeys scores of Score level 3 and above in applied mathematics and grades of C or better in students’ corresponding college level mathematics courses, showing little relationship between variables. The $p$-value of <.001 indicated a strong significance in the evidence of the weak relationship.
Research Question 2

Is there a relationship between students’ scores of level 3 or higher in the WorkKeys assessment of reading for information and grades of C or higher in the first college level reading course in which they are enrolled at the community and technical college?

A notable finding was that with the Pearson $r = .164$ for students’ WorkKeys scores of score level 3 and above in reading for information and grades of C or better in students’ corresponding college level reading courses, weak relationship was found between variables. The $p$-value of .012, however, indicated significance within the evidence found regarding the relationship.

Research Question 3

Is there a relationship between students’ scores of level 5 or higher in the WorkKeys assessment of applied mathematics and grades of C or higher in the college level mathematics class in which they are enrolled at the community and technical college?

A notable finding was that with the Pearson $r = .070$ for students’ WorkKeys scores of Score level 5 and above in applied mathematics and grades of C or better in students’ corresponding college level reading courses, weak relationships was shown between variables. The $p$-value of .0165 also indicated significance in the evidence of the relationship.
Research Question 4

Is there a relationship between students’ scores of level 5 in the WorkKeys assessment of reading for information and grades of C or higher in the college level mathematics class in which they are enrolled at the community and technical college?

A notable finding was that with the Pearson $r = .109$ for students’ WorkKeys scores of Score level 5 and above in reading for information and grades of C or better in students’ corresponding college level reading courses, weak relationship was found between variables. The $p$-value computed was .013 which indicated significance in the evidence of the relationship.

Research Question 5

Is there a relationship between students’ scores of level 3 or higher in the WorkKeys assessment of locating information and grades of C or higher in their other college level courses, including introduction to computers, physics, communication, art, and blueprint reading, in which they are enrolled at the community and technical college?

Resulting in a Pearson $r = .135$, the research also showed that there was weak relationship between students who scored score level 3 or higher in the WorkKeys assessments of locating information and achieving a grade of C or better in their other college level courses as defined by the researcher. The $p$-value computed was <.001 which indicates strong significance within the evidence of the weak relationship.
*Research Question 6*

Is there a relationship between students’ cumulative grade point averages and WorkKeys reading for information assessment scores?

Results indicated a weak relationship between cumulative grade point averages and score levels of WorkKeys reading for information scores. Per the Pearson \( r \) correlation of .206, there is a weak relationship between cumulative grade point averages and score levels of ACT reading for information WorkKeys scores. The \( p \)-value computed was <.001 which indicates strong significance within the evidence of the relationship found.

*Research Question 7*

Is there a relationship between students’ cumulative grade point averages and WorkKeys applied mathematics assessment scores?

Results indicated a weak relationship between cumulative grade point averages and score levels of WorkKeys applied mathematics scores. Per the Pearson \( r \) correlation of .184 there was weak relationship between cumulative grade point averages and score levels of ACT applied mathematics WorkKeys scores. The \( p \)-value computed was <.001 which indicates strong significance within the evidence of the relationship found.

*Research Question 8*

Is there a difference in the mean scores of the WorkKeys reading for information assessment between non-healthcare-declared technical majors enrolled within the KCTCS?
The \( t \)-value of 8.67 and an effect size of .70416 indicated there is significant differences in the WorkKeys reading for information mean scores of declared healthcare versus non-healthcare majors. The \( p \)-value computed was <.001 which indicates strong significance within the evidence of the strong relationship found.

Research Question 9

Is there a difference in the mean scores of the WorkKeys applied mathematics assessment between healthcare and non-healthcare-declared technical majors enrolled within the KCTCS?

The \( t \)-value of -.072 and an effect size of .05417 suggests there is little significant difference in the WorkKeys scores of declared healthcare versus non-healthcare majors. The \( p \)-value of .471 also indicated little significance in the evidence of the relationship.

Research Question 10

Is there a difference in the mean scores of the WorkKeys applied mathematics assessment between males and females enrolled within the KCTCS?

The \( t \)-value of -1.08 with a \( p \)-value of 0.289 indicates little significant difference in the mean scores between the two groups. The effect size determined showed a .11227 value, which is little significant difference for the sample size.

Discussion

Literature and existing research studies exist regarding WorkKeys and its uses within business and industry, secondary, and some postsecondary institutions. Past
research has shown that in some cases relationships exist between age and gender and WorkKeys assessments. Little research has been conducted on WorkKeys use as a predictor of success in community and technical colleges. The study presented attempted to look at various relationships between WorkKeys assessments and grades as well as differences between program majors and gender. Weak relationships at best were found. Additional research is suggested in order to determine if WorkKeys assessments can be utilized as an indicator of community and technical college student success.

Implications

Implications of the study could be that ACT will decide to conduct further research utilizing the WorkKeys assessment’s use within community and technical colleges. Correlations have been made by ACT to reading assessments and grade levels. However, national career readiness certificates and state-score level certificates are being awarded at score level 3 and better. The research presented could ignite further studies surrounding the score levels and the awarding of certificates or further studies on if the same skills are needed to be work versus college ready. Community and technical colleges could utilize this research as a tool to determine if WorkKeys should be utilized in their college as a measure of student success. These colleges or even individuals could build on the information presented in this study, as well as past WorkKeys and ACT research studies, to conduct their own studies of relationships between WorkKeys scores and other variables.
Study Limitations

The study is limited to the technical program (Associate in Applied Science, or AAS) students of Hazard Community and Technical College, Southeast Kentucky Community and Technical College, Somerset Community College, Maysville Community and Technical College, Ashland Community and Technical College, Bluegrass Community and Technical College, and Big Sandy Community and Technical College. Generalizability will be limited to this group of students and the Commonwealth of Kentucky’s KCTCS schools located in central, eastern, and southeastern Kentucky. Generalizations of the findings can be made to community and technical colleges within the KCTCS at best. The study could be used to justify ACT’s conducting further research nationwide of the use of WorkKeys as an effective success measure with community and technical colleges.

The study did not address the numerous variables that affect a student’s grade in a class and overall grade point average such as personal issues, instructors, learning styles, personal preference, and so forth. However, this study does not consider those factors. The study presented examined WorkKeys scores from assessments in reading for information, applied mathematics, and locating information and matched those scores to college level course grades in reading, mathematics, and other courses as identified in the study. Other limitations are that the study was conducted within the scope of only seven of the 16 community and technical colleges in the Commonwealth of Kentucky. Generalizations made could only be to that of the schools involved or at best within the KCTCS system. Only technical program student data were analyzed, not data from students enrolled in Associate in Science or Associate in Arts programs.
Other limitations discovered during the study were that some students never took any college level courses but only developmental courses, a nationwide community and technical college issue. The study did not include the data for those students who had WorkKeys scores, but enrolled in developmental courses and not college level courses as the first associated course after the WorkKeys assessment. This could have limited the study due to what could have been discovered about these students and the links between their WorkKeys assessment scores and their developmental course grades. Because data from the students who took the developmental courses were not included, the data were limited by the number of reading and mathematics course records that could actually be selected and examined in the study. Due to the certificates and options that community and technical colleges offer, some students in the sample took only classes within their program area and avoided taking any mathematics and/or reading courses as defined in the study. Finally, some students took only one of the classes being researched. For example, some took a mathematics class but no college level reading course. Another issue discovered when extracting the data was the number of students who could not be found in the database due to name changes. Another limiting factor was that this study looked at the grades of the students within the KCTCS only and did not review any grades from any other schools attended. Another possible limitation was that there was no research on how long of a period expired before the student took a class, only that the student took the class after she or he had taken the initial WorkKeys assessments. Other issues included majors that had changed, which limited studies that could be done based on program major. Often, a student may have still been listed as enrolled in one major, but judging by the classes the person had completed; obviously the declared major was
not correct. However, no data change form had been completed or information updated. Finally, within the KCTCS, healthcare program majors do not take WorkKeys as their post-test to leave a program. At present, their state or national licensure exam is the measure for success. This prevented pre-/post-test studies on healthcare students or comparisons of pre-/post-test data of healthcare students versus other program areas.

One final limitation that should be noted is that data randomly retrieved from the colleges’ Associate in Applied Science degree programs were slightly skewed. The number of students from each college who had taken WorkKeys assessments in Reading for information, applied mathematics, and locating information was not equal.

The data leaned heavily on the eastern end of the Commonwealth of Kentucky but were still representative in regard to gender, race, and various technical programs. Of the total sample size, 1,280 were from metropolitan colleges/areas, and 2,024 were from rural community and technical colleges/areas, resulting in a 60–40 split leaning on the rural side. Some of the reason for this was based on the fact that the scoring center data located at Hazard Community and Technical College consisted of larger numbers from certain schools involved within the study. Assessment data from each school and student were taken from ACT Expresscore, and grades and grade point averages for each student were extracted from PeopleSoft. The data were then exported into a Microsoft Excel spreadsheet and, finally, summarized statistically utilizing Microsoft Excel, Minitab, and SPSS.

The study presented does not examine variances in test scores regarding gender, race, and so forth except for healthcare vs. non-healthcare student analysis. It could be that test-taking strategy courses could be helpful to all students to improve their
WorkKeys score levels. The variances in college level course grades could be improved with study skills and introduction to college (GE 100) classes. A possible study could be to examine grades of students who have had such courses in comparison to those who did not, as well as looking at the WorkKeys scores as a covariant.

**Recommendations/Further Study**

Results of the research provided here are a beginning for further research that could be conducted in regard to WorkKeys and its use as an indicator for community and technical college student success. A study that eliminates and/or examines the other variables that can affect the grade in an entry level college class along with the WorkKeys scores would need to be conducted to further determine if true relationships exist or not. Other variables that could be examined in regards to grade in a class include class format, instructor relationship, and external factors such as employment status. The researcher would also suggest that further research be conducted within other states and within other community and technical colleges. Although the research presented examined both rural and metropolitan area community and technical colleges, the researcher would suggest an in-depth study of larger, metropolitan community and technical colleges’ WorkKeys scores and grades in entry-score level college reading and mathematics courses versus those scores and grades in smaller, more rural community and technical colleges. Neither race nor age was examined in the research, and those variables could also be reviewed in regard to WorkKeys scores and entry-score level college course grades to determine if differences exist.
The research presented examined the WorkKeys scores and reading and mathematics courses, but further research could be performed on each specific class and the WorkKeys score. For example, one could examine the relationship between Reading for information scores and only PY 110 Introduction to Psychology. Research could also be conducted regarding applied mathematics and Reading for information and technical program class grades.

Additional research should be conducted to determine if the healthcare students performed better in their college level reading and mathematics courses versus the non-healthcare students as this could determine if a correlation exists between the WorkKeys scores of the healthcare students and their grades in their college level courses.

A possible further study could be based on the under-preparedness of entering college freshmen into college level mathematics courses as well as further study at other community and technical colleges both within the Commonwealth of Kentucky and within other states. Further study on program majors and comparisons could be performed. If data are available from other countries’ community and technical college systems on entrance exam data, this could prove an interesting study as well.

Students’ attitudes toward testing and WorkKeys assessments specifically were not examined in the presented research. A survey could be administered to determine attitudes toward testing and uniform information could be given out to all students within KCTCS to ensure that they all understand and have the same information regarding WorkKeys.

Suggested additional research includes but is not limited to the following:
- Additional research for healthcare majors vs. non-healthcare majors and WorkKeys is recommended.
- Studies of relationships between WorkKeys scores and grades within specific program major areas and differences in WorkKeys could prove beneficial.
- Studies of comparisons of WorkKeys and other college entrance exams, as well as exams given in other countries, could prove interesting.
- Studies that examine and/or eliminate other variables that could affect WorkKeys scores and or course grades are recommended.
- Additional research within Kentucky and other states examining the under-preparedness of entering college students in mathematics is recommended.
- Additional WorkKeys research within Kentucky and other states examining WorkKeys scores and grades in associated college level courses utilizing other statistical measures is recommended.
BIBLIOGRAPHY


75


ACT, Inc. (2006b). *Ready for college and ready for work: Same or different?* Iowa City, IA: Author.


APPENDIX A

MSU IRB APPROVAL LETTER
December 7, 2006

Jennifer Lindon

168 Woodland Street
Hazard, KY 41740

RE: IRB Study #06-325: Utilizing ACT Workkeys as a Measure of Community and Technical College Student Success

Dear Ms. Lindon,

The above referenced project was reviewed and approved via administrative review on 12/17/2006 in accordance with 45 CFR 46.101(b)(4). Continuing review is not necessary for this project. However, any modification to the project must be reviewed and approved by the IRB prior to implementation. Any failure to adhere to the approved protocol could result in suspension or termination of your project. The IRB reserves the right, at any time during the project period, to observe you and the additional researchers on this project.

Please note that the NSU IRB is in the process of seeking accreditation for our human subjects protection program. As a result of these efforts, you will likely notice many changes in the IRB’s policies and procedures in the coming months. These changes will be posted online at http://www orc.msstate.edu/human/ahrrp.php.

Please refer to your IRB number (#06-325) when contacting our office regarding this application.

Thank you for your cooperation and good luck to you in conducting this research project. If you have questions or concerns, please contact me at cwilliams@research.msstate.edu or call 662-325-5220.

Sincerely,

Christine Williams
IRB Compliance Administrator

cc: James Ed Davis
APPENDIX B

KCTCS APPROVAL LETTER
October 21, 2006

Jennifer Chester
Hazard Community and Technical College
One Community College Drive
Hazard, Ky. 41701

Dear Ms. Chester,

After careful consideration of your application to KCTCS Human Subjects Review Board, I have determined that you are eligible for exemption from federal regulations regarding the protection of human subjects based on your research using a procedure that meets the exemption criteria regulation of section 7 (2). Understanding that you have also applied with Mississippi State University.

Thank you for your cooperation in meeting the federal requirements for conducting research that utilizes human subjects. We understand that you are also seeking approval from KCTCS Human Subjects Review Board. We appreciate your notification to this Board and we will keep your information on file.

Sincerely,

[Signature]

Keith W. Bird, Ph.D.
Chancellor
Chair, KCTCS Human Subjects Review Board

cc: Christine Whitfield
APPENDIX C

ACT APPROVAL LETTER
January 5, 2009

Ms. Jennifer Chester
Hazard Community and Technical College
One Community College Drive
Hazard, KY 41701

Dear Ms. Chester:

I am responding to your request to have a letter from ACT indicating you can view assessment scores via our Express Score software. My understanding from Dr. Helen Palmer, our Director of Industrial/Organizational Psychology, is that you are using WorkKeys assessment scores in the research you are conducting for your dissertation and that you have secured appropriate permissions to use the data in your research.

Our records indicate that Hazard Community and Technical College is part of our network of WorkKeys Solution Providers and that you are our key contact of record at that community college. As such, you are authorized to view assessment scores (via Express Score, WorkKeys Internet Version as well as batch scoring for answer sheets physically returned to ACT for scoring) for those assessments administered at your community college.

Good luck with your research.

Sincerely,

[Signature]

Oliver Cummings, Ph.D.
Assistant Vice President
Workforce Development Division

500 ACT Drive PO Box 96 Iauna City, Iowa 52246-0096 1-800-37-1000 www.act.org
APPENDIX D

PRESIDENTS’ APPROVAL LETTERS
November 3, 2008

Ms. Jennifer Chester Lindon
PhD Candidate, Mississippi State University
Hazard Community & Technical College
One Community College Drive
Hazard, KY 41701

Dear Ms. Lindon:

In response to your letter dated October 10, requesting permission to analyze ACT Workkeys™ scores of students from Maysville Community and Technical College, I am granting you permission under the following conditions: scores be obtained from the ACT Workkeys Express Score™ database housed at Hazard Community and Technical College and that no names, social security numbers or PeopleSoft™ ID numbers will be used in your research.

You have also requested permission to list Maysville Community and Technical College student program majors declared and cumulative grade point averages as listed in the PeopleSoft™ database for the Kentucky Community and Technical College System and permission is granted based upon the above conditions being met.

Please provide me with a copy of the final results once you have completed your dissertation. If you need anything further, feel free to give me a call at (606)759-7141, ext. 60147.

Sincerely,

Ed Story, Ph.D.
President/CEO

MCTC is an equal opportunity and education institution.
www.maysvillekctc.edu

Kentucky Community and Technical College System

89
October 28, 2018

Jennifer Chester Lindon
Dean of Continuing Education, Workforce and Community Development
Hazard Community and Technical College
One Community College Drive
Hazard, KY 41701

Dear Ms. Lindon:

I am very pleased to hear you are nearing completion of your degree from Mississippi State University. This is to confirm that you have our permission to use student information from students at Big Sandy Community and Technical College. I understand that you will use ACT WorkKeys scores and you will use the PeopleSoft database to gather program and grade information for the students.

I would be interested in seeing a copy of your final results as well. Best wishes to you.

Sincerely,

George D. Edwards
President

Big Sandy
KENTUCKY COMMUNITY AND TECHNICAL COLLEGE SYSTEM
October 16, 2008

Ms. Jennifer Chester Linder
Hazard Community and Technical College
One Community College Drive
Hazard, KY 41701

Dear Ms. Linder,

Congratulations on prevailing at this, your last step in fulfilling your PhD requirements. To assist you in your plans for a dissertation, this letter is to grant Somerset Community College's permission for you to conduct research to analyze ACT WorkKeys™ scores of students from Somerset Community College. Permission includes obtaining Somerset Community College student program majors declared and cumulative grade point averages as listed in the Peoplesoft™ database for the Kentucky Community and Technical College System.

Permission is granted contingent on your protecting the confidentiality of all Somerset Community College students and employees. As you offer, we will welcome a copy of the final results of your completed work.

Best wishes in your pursuit of academic accomplishment.

Sincerely,

Jo Marshall, Ph.D.
President/CEO
October 10, 2008

Ms. Jennifer Chester Lindon
Hazard Community & Technical College
One Community College Drive
Hazard, KY 41701

Dear Ms. Lindon:

I have received your letter of September 29, 2008 requesting permission to access confidential ACT Work Keys™ test scores of Ashland Community & Technical College students.

Provided there are complete safeguards against public disclosure of this confidential information, permission is granted to use this in your dissertation.

I congratulate you on choosing Mississippi State University. However, I finished my work at Ole Miss so I am just a bit prejudiced to my alma mater. Good luck!

Sincerely,

Greg Adkins
President & CEO

cc: Dr. Alan Coben
August 2, 2008

Jennifer Chatter,
Dean of Continuing Education, Workforce and Community Development
Hazard Community and Technical College
One Community College Drive
Hazard, KY 41701

Dear Jennifer,

I am pleased to support you in seeking your PhD in Community College Leadership from the Missouri State University. In preparing for your dissertation on ACT Workkeys™ and in conjunction with appropriate KCTCS System office approval, Hazard Community and Technical College gives you permission to:

- Analyze ACT Workkeys™ scores of students from HCTC.
- List HCTC student program majors declared and cumulative grade point averages as listed in the PeopleSoft™ database for the Kentucky Community and Technical College System.
- Obtain ACT Workkeys™ test scores from the ACT Workkeys ExpressScore™ database housed at HCTC.

Please work with Lois Puffer, Coordinator of Institutional Research and Doug Fraley, Vice President of Student Services in obtaining your information and coordinating with any necessary KCTCS System office approval.

The college has no reservation regarding this recommendation and enthusiastically supports you in seeking your PhD. If you have any questions, please contact me.

Sincerely,

Dr. Allen Gober
President/CEO
October 10, 2008

Ms. Jennifer Chester Lindon
Hazard Community and Technical College
One Community College Drive
Hazard, KY 41701

Dear Jennifer:

Permission is granted for you to list Southeast Kentucky Community & Technical College student program majors declared and cumulative grade point averages as listed in the PeopleSoft database for the Kentucky Community and Technical College System. It is my understanding that this information will be used in the preparation of a dissertation to fulfill the requirements of your doctoral program at Mississippi State University.

I wish you the best of luck with your research and with completing the program.

Sincerely,

W. Bruce Ayers
November 14, 2009

Jennifer Chester Ludden
Director, Community & Economic Development
Hazard Community & Technical College
One Community College Drive
Hazard, KY 41701

Dear Jennifer,

Please accept this letter as permission to both analyze the ACT WorkKeys scores of Bluegrass Community & Technical College students and to list the program majors declared and cumulative grade point average in the KCTCS PeopleSoft database system as part of your research. It is our understanding that you will abide by the current KCTCS policies and the policies set forth in TERPA regarding the use of student data.

If you have any problems with the data, please don’t hesitate to call Mark Manuel, our VP of Corporate & Community Development. I wish you the best in completing your research and dissertation and applaud your dedication to furthering your knowledge and education.

Sincerely,

[Signature]

Dr. Augusta A. Julian
President & CEO

Cc: Mark Manuel