

AN ABSTRACT OF THE DISSERTATION OF

Deanna D. Schultz for the degree of Doctor of Philosophy in Education presented on December 7, 2011.

Title: College or Career Ready? Perceptions of High School Students Related to WorkKeys Assessments.

Abstract approved: _____
Sam Stern

Concern about college and career readiness has been expressed in both the business and education arenas. Employers are calling for entry-level employees with basic academic skills and educators are being held accountable for student achievement in academic areas similar to those required by employers. In this environment, WorkKeys has emerged as a set of assessments that could respond to the needs of both employers and educators and serve as an indicator to test takers of their readiness for further education or a career. In Alaska, state policymakers selected WorkKeys for use with high school juniors in an effort to measure both college and career readiness, and statewide testing was implemented in the fall of 2010.

While past studies involving WorkKeys have focused on assessment results related to workforce development, academic indicators, or demographic variables, the purpose of this study was to describe the college and career readiness perceptions of high school juniors related to the WorkKeys Reading for Information, Locating Information, and Applied Mathematics assessments. A survey administered to 178 urban high school juniors at the time they received their WorkKeys results gathered

student perceptions of the WorkKeys assessments in general as well as perceptions of college and career readiness.

The key findings of this study were that student perceptions of college and career readiness were much higher than the results of the assessments indicated, and students found value in using WorkKeys results for college and career planning. This suggested the assessment results would be useful in career development interventions with students. This was the first year of mandatory WorkKeys assessments in the state and further study is recommended to gather rural student perceptions, further explore factors that students believe make the assessments useful, and determine the influence of the assessments and related interventions on academic self-efficacy.

© Copyright by Deanna D. Schultz
December 7, 2011
All Rights Reserved

College and Career Ready? Perceptions of High School Students
Related to WorkKeys Assessments

by
Deanna D. Schultz

A DISSERTATION

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Doctor of Philosophy

Presented December 7, 2011
Commencement June 2012

Doctor of Philosophy dissertation of Deanna D. Schultz presented on
December 7, 2011.

APPROVED:

Major Professor, representing Education

Dean of the College of Education

Dean of the Graduate School

I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

Deanna D. Schultz, Author

ACKNOWLEDGEMENTS

It has been quite the journey to completion of this degree and so many people have supported me along the way. I would like to express appreciation to my committee members, Deborah Rubel, Michael Dalton, Michael Morrison, and Joseph Orosco for guiding and encouraging me, and especially to my chair, Sam Stern, for recognizing the unique opportunity in conducting this research and your positive support throughout the entire process.

This study would not have taken place without the support of faculty, staff, and administrators in the Anchorage School District. Special thanks to Rick Rios for opening the door to begin discussions, Laurel Vorachek and Mike Henry for approving the project, and Dan Gellego and John Gaskins for agreeing to let me survey your students and setting aside time to do it. Thanks also go to Tom Hamill for helping with the pilot study.

I would also like to express thanks to my colleagues at UAA and around the state. You have been with me through the ups and downs of this process and supported me all the way. Special thanks to Lexi Hill and Diane Hirshberg at UAA's Institute for Social and Economic Research for sharing your expertise and providing me with the tools to conduct the statistical analysis.

Four years ago, I met a group of fellow CCLP 17 classmates at Silver Falls who became dear friends and colleagues. Thank you all for making school fun and for your support as we struggled and triumphed together.

Finally, to my family and friends—you have cheered me on and believed in me when I wasn't sure this was possible. And a very special thanks to my cousin, Dr. James Russett, who inspired me. You are wise beyond your years, and I am eternally grateful to you.

TABLE OF CONTENTS

| | <u>Page</u> |
|--|-------------|
| Chapter 1: Introduction | 1 |
| Research Purpose | 4 |
| Research Questions | 5 |
| Significance..... | 7 |
| Educational use of WorkKeys..... | 7 |
| WorkKeys as state-mandated high school tests | 7 |
| Educational policies in Alaska..... | 8 |
| Summary | 9 |
| Chapter 2: Literature Review | 11 |
| Approach to the Literature | 14 |
| Overview of the Literature..... | 15 |
| WorkKeys assessments | 16 |
| Career readiness | 22 |
| College readiness | 25 |
| Self-efficacy | 32 |
| Summary of Literature | 39 |
| Chapter 3: Research Methodology..... | 41 |
| Research Design..... | 41 |
| Participant and Site Selection..... | 42 |

TABLE OF CONTENTS (Continued)

| | <u>Page</u> |
|---|-------------|
| Survey Instrument Design..... | 43 |
| Developing the instrument..... | 44 |
| Survey reliability and validity..... | 46 |
| Data Collection..... | 51 |
| Survey Administration..... | 51 |
| Strategies to Protect Human Subjects..... | 53 |
| Data Analysis..... | 53 |
| Strategies to Ensure Soundness of Data and Findings..... | 55 |
| Limitations of the Study..... | 56 |
| Chapter 4: Results..... | 59 |
| Overview of Respondents and Their WorkKeys Results..... | 60 |
| Reading for Information results..... | 62 |
| Locating Information results..... | 65 |
| Applied Mathematics results..... | 67 |
| Perceptions of College Readiness Related to WorkKeys Assessments..... | 68 |
| Perceptions of Career Readiness Related to WorkKeys Assessments..... | 77 |
| Additional Findings..... | 84 |
| Chapter 5: Discussion and Conclusions..... | 87 |
| Summary of Findings..... | 88 |
| Readiness perceptions and readiness scores..... | 88 |

TABLE OF CONTENTS (Continued)

| | <u>Page</u> |
|---|-------------|
| WorkKeys and self-efficacy..... | 92 |
| Value of WorkKeys to students | 96 |
| Implications for Practice | 99 |
| Recommendations for Further Study | 102 |
| Bibliography..... | 104 |
| Appendices..... | 115 |
| Appendix A: Description of WorkKeys Assessments | 116 |
| Appendix B: SCANS Competencies and Skills..... | 118 |
| Appendix C: Student Survey..... | 120 |
| Appendix D: Parent Notification Letter..... | 126 |
| Appendix E: Student Information Letter..... | 127 |

LIST OF TABLES

| <u>Table</u> | <u>Page</u> |
|--|-------------|
| 1. Ethnicity of Sample Compared to High School and School District Populations..... | 61 |
| 2. Results of Survey Questions 1, 3, and 5: WorkKeys Scores Compared to Bartlett High School Population Scores..... | 63 |
| 3. Results of Survey Questions 2, 4, and 6: Perceptions of WorkKeys Results..... | 65 |
| 4. Cross-tabulation of WorkKeys Scores and Perceptions of Results | 65 |
| 5. Results of Survey Question 8: College Readiness | 69 |
| 6. Cross-tabulation of WorkKeys Scores and Survey Question 8a: My WorkKeys results caused me to rethink my education options after high school. | 70 |
| 7. Cross-tabulation of WorkKeys Scores and Survey Question 8b: I believe the WorkKeys results are useful in planning for education after high school. | 71 |
| 8. Cross-tabulation of WorkKeys Scores and Survey Question 8c: After seeing my WorkKeys results, I feel confident that I have the skills to be successful in college. | 72 |
| 9. Cross-tabulation of WorkKeys Scores and Survey Question 8d: There is no connection between my WorkKeys results and my education after high school. | 73 |
| 10. Responses to Survey Questions 11 and 12 Regarding Confidence in Academic Skills..... | 74 |
| 11. Cross-tabulation of Perceptions of WorkKeys Results and Shift in English and Math Skills Confidence..... | 75 |
| 12. Cross-tabulation of Survey Question 8 and GPA | 77 |
| 13. Results from Survey Question 9: Career Readiness | 79 |

LIST OF TABLES (Continued)

| <u>Table</u> | <u>Page</u> |
|--|-------------|
| 14. Cross-tabulation of WorkKeys Scores and Survey Question 9a: After seeing my WorkKeys results, I feel confident that I have the skills to be successful in a career | 80 |
| 15. Cross-tabulation of WorkKeys Scores and Survey Question 9b: My WorkKeys results caused me to consider career options I had not thought about before | 81 |
| 16. Cross-tabulation of WorkKeys Scores and Survey Question 9c: I believe the WorkKeys results are useful in planning for my future career | 82 |
| 17. Cross-tabulation of WorkKeys Scores and Survey Question 9d: There is no connection between my WorkKeys results and my career plans | 83 |
| 18. Cross-tabulation of Survey Questions 8 and 9 | 84 |
| 19. Cross-tabulation of WorkKeys Scores and Completion of Practice Questions or Tests | 85 |
| 20. Cross-tabulation of Perceptions of WorkKeys Results and Completion of Practice Questions or Tests | 86 |

College and Career Ready? Perceptions of High School Students Related to WorkKeys Assessments

Chapter 1: Introduction

...business and industry must have access to an abundant pool of well-qualified workers, which in turn requires that the public school system produce graduates who are ready for the challenges of college and the workplace. Unfortunately, that is not happening (U.S. Chamber of Commerce Institute for a Competitive Workforce & National Career Pathways Network, 2009, p. 4).

Concern about college and career readiness has been expressed in both the business and education arenas. U.S. Department of Labor projections indicate that nearly 50% of all new jobs created between 2008 and 2018 will require some form of postsecondary award or training (Lacey & Wright, 2009), and for businesses to be globally competitive, entry-level workers must have appropriate reading and math skills to qualify for these new jobs (Council on Competitiveness, 2008). At the same time, only 34% of students who graduate from high school have the skills necessary for college (Greene & Winters, 2005). This skill deficiency is particularly concerning to community colleges, where research indicated 38-68% of first-time students took at least one remedial course (Perin & Charron, 2006). Bilingual, low income, and first generation students make up a significant portion of these underprepared students (Cohen & Brawer, 2008). Policymakers at the local, state, and national levels are seeking ways to better prepare all students and measure their college and career readiness.

In 2008, Alaska state policymakers determined that an assessment was needed to measure high school students' preparation for college or work (Work

Ready/College Ready, 2010), and the Commissioner of Education selected ACT WorkKeys Reading for Information, Locating Information, and Applied Mathematics as the assessments. The ACT WorkKeys assessment system was developed with input from employers and educators to address the workforce training needs identified in the 1983 report, *A Nation at Risk* (ACT, Inc., 2009 Autumn). The assessments within this system were designed to provide information about generic workplace skills that would assist individuals in making career decisions and employers in making hiring decisions. By reporting results in the form of a skill scale, the test taker, educator, or employer could use the results to indicate level of proficiency on generic workplace skills (McLarty & Vansickle, 1997). The assessment questions were designed to reflect both the content and the context of the workplace while measuring skills from the basic level expected by employers to a level beyond which specialized training would be required (McLarty & Vansickle, 1997). For example, the test taker may be presented with a memo describing new garbage collection rules for shopping mall businesses, followed by one or more questions requiring the test taker to interpret the memo (ACT, Inc., 2007b). A table of WorkKeys assessments with descriptions and skill levels is included in Appendix A.

The WorkKeys system not only provides test takers with skill level scores but also provides strategies for improvement and resources to compare scores to skill levels of specific jobs through job profiling (ACT, Inc., 2000). Job profiles are developed by trained experts who observe jobs within an organization and analyze specific skills that are used in each job (ACT, Inc., 2000; McLarty & Vansickle,

1997). The job profile skills are then rated on the same skill scale as the WorkKeys assessments. The job profile skill levels provide a real world reference for WorkKeys test takers.

These unique features of WorkKeys assessments led this researcher to use them in the mid-1990s with high school seniors in a cooperative work experience class. Because WorkKeys assessments asked work-based questions rather than academic questions, provided criterion-referenced score interpretations that compared scores to skill levels needed in jobs rather than norm-referenced score interpretations that compared the students to other students, and reported results along with areas in which students could improve their skills, it held some promise for these high school students who saw no meaning in other assessments. The job profile portion of the WorkKeys system allowed students to recognize the variety of jobs for which they had skills.

Since the 1990s, a Career Readiness Certificate has been added to the WorkKeys system. ACT job profilers have analyzed over 16,000 jobs and research has identified reading, math, and locating information as important skills in 85% of the jobs (ACT, Inc., 2009a). The Career Readiness Certificate is based on the three WorkKeys assessments that measure those skills: Reading for Information, Locating Information, and Applied Mathematics. Anyone who takes these three assessments can earn a bronze, silver, gold, or platinum certificate based on the skill levels obtained. The level of certificate is also an indicator to employers of a potential employee's basic skills.

The WorkKeys assessment system and Career Readiness Certificate are now being used by states in several parts of the country to measure college and career readiness of high school students (ACT, Inc., 2011). The surge in the use of WorkKeys has piqued this researcher's interest and raised questions leading to this research.

Research Purpose

Mandatory statewide testing occurs at all grade levels of K-12 education as a means to measure academic achievement of students. In Alaska, students are required to take reading, writing, and math Standards Based Assessments (SBAs) in grades 3 through 9; science SBAs in grades 4, 8, and 10; Terra Nova tests in grades 5 and 7; the Alaska High School Graduation Qualifying Exam in grade 10; and new in the 2010-2011 academic year, three WorkKeys assessments in grade 11 (Alaska Department of Education and Early Development, 2011). While policymakers have the best interests of students in mind when they set policy, implementation often shifts the focus and resources to the assessments and the results. The purpose of this study was to focus on the students and investigate the college and career readiness perceptions of high school juniors related to the ACT WorkKeys Reading for Information, Locating Information, and Applied Mathematics assessments. The recently approved Alaska Board of Education regulation requires all Alaska high school juniors to be assessed on college and career readiness in the areas of reading for information, locating information, and applied math, with the 2010-2011 academic year the first year of statewide implementation (Work Ready/College Ready, 2010; Alaska Career Ready,

2011). The three assessment areas in the regulation align with the WorkKeys assessments necessary to earn a Career Readiness Certificate.

If the Career Readiness Certificate signals to a high school student that he or she has skills an employer seeks, this may influence the choices and decisions the student makes regarding the future. This study focused on the initial impact of WorkKeys results on high school students' perceptions of college and career readiness and set aside additional questions for future studies.

Research Questions

This study sought to add student perspectives to the discussions about WorkKeys assessments by focusing on the following questions.

Question 1: What are the perceptions of high school students about college readiness related to the WorkKeys assessments?

WorkKeys assessments measure skills using a workplace context rather than an academic context. Students who score poorly on an academic college test such as the ACT or SAT test may score differently on the WorkKeys assessments. According to an ACT study (ACT, Inc. 2006b), specific score levels on WorkKeys assessments are comparable to college readiness benchmarks on the ACT college test. For example, a Level 5 score on WorkKeys Reading for Information is comparable to an ACT college test score for reading in a range of 19 to 23, a range that is considered college ready (ACT, Inc., 2006b).

In addition, the WorkKeys assessment results include suggested strategies for the test taker to improve his or her skills (ACT, Inc., 2010d). A guidance counselor or

teacher might encourage the student to use this information along with other considerations in planning future coursework. Research indicates that high school coursework has a greater effect on college success than test scores or class rank/grade point average (GPA) (Adelman, 1999; Musoba, 2006). The WorkKeys results and suggested strategies are tools available for students to use as they plan for further education.

Question 2: What are the perceptions of high school students about career readiness related to WorkKeys assessments?

The unique connection WorkKeys makes between school and work may provide high school students with a different perspective of cognitive ability and may influence students' self-efficacy. Bandura's theory of self-efficacy suggests that a person's belief in his or her ability to achieve a goal, or self-efficacy, can impact one's choice of career (Bandura, 1997). This theory is closely tied to the concept of career maturity, which is defined as "the readiness of an individual to make informed, age-appropriate career decisions and cope with appropriate career development tasks" (Powell & Luzzo, 1998, p. 145). The career development of high school students is critical as they make choices about future education and work. The WorkKeys assessment provides a new variable to consider in studying the self-efficacy of high school students and the career decisions they make.

Significance

This study offers scholarly and practical significance in three primary areas: (a) the use of WorkKeys in education; (b) the use of WorkKeys as state-mandated tests for high school students; and (c) educational policy in Alaska.

Educational use of WorkKeys. WorkKeys was developed as a workforce development tool (McLarty & Vansickle, 1997) and the focus of past research by ACT, Inc. and several other researchers has been on its use for employment (ACT, Inc., 2006a; ACT, Inc., 2007a; Greene, 2008; Hendrick, 2006; Miller, 1997; Rotundo & Sackett, 2004). Continuing research by ACT, Inc. is focused on developing new WorkKeys assessments, revising existing assessments, or examining the impact on employers who use WorkKeys for job performance, not on determining the use of the assessments in education (T. Kilijanek, personal communication, February 2, 2010). Research on the use of WorkKeys in education is expanding but has focused on the relationship between demographic variables and WorkKeys scores (Barnes, 2002; Stone, 2007), on the WorkKeys results of students in technical programs (Belton, 2000; Hall, 2010), and WorkKeys scores as either a predictor or indicator of post-secondary student success (Bowles, 2004; Lindon, 2010). This study approached the topic from a different perspective, focusing on the test takers and their perceptions of college readiness or career development based on the assessments.

WorkKeys as state-mandated high school tests. Several states currently require testing of high school students using WorkKeys assessments. Illinois and Michigan use WorkKeys assessments to measure high school academic achievement

(ACT, Inc., 2011) and Alaska began mandatory testing of high school juniors using WorkKeys during the 2010-2011 school year (Work Ready/College Ready, 2010; Alaska Career Ready, 2011); North Dakota and Wyoming mandate either the ACT college test or ACT WorkKeys assessments (ACT, Inc., 2011). A report by the National Governors Association Center for Best Practices, National Conference of State Legislatures, National Association of State Boards of Education, and Council of Chief State School Officers (2008) called for curriculum and external assessments to measure college- and career-ready skills and that report may influence other states to mandate WorkKeys assessments for high school students. Analyzing the effect of WorkKeys on college readiness and career development perceptions of high school students may provide useful information for policymakers seeking to prepare students for education and work after high school.

Educational policies in Alaska. Educational policies that involve WorkKeys assessments are evolving in Alaska. During the 2010 legislative session, a bill was passed to establish a merit-based scholarship for high school graduates and to form the Advisory Task Force on Higher Education and Career Readiness (Senate Bill 221, 2010). The merit scholarship or Alaska Performance Scholarship was made available for the first time to spring 2011 high school graduates and included WorkKeys scores as an optional eligibility criterion (Alaska Commission on Postsecondary Education, 2011). The Advisory Task Force on Higher Education and Career Readiness received testimony and studied research and best practices to address the following goal:

Every student in Alaska will complete high school with sufficient skills to enter the workforce, or a course of study at a postsecondary institution, without

the need for remedial coursework in the core areas of reading, writing, and math by the end of fiscal year 2017. (Alaska Advisory Task Force on Higher Education & Career Readiness, 2011, p. 2)

The final report of the task force included a recommendation to the Alaska legislature regarding how those skills might be measured:

The University of Alaska Board of Regents and the state Board of Education...collaborate in the use of skills assessment tools for students to gain a realistic appraisal of their existing skill level early-on so they can prepare for college-level work while still in high school. (p. 14)

WorkKeys along with the ACT, SAT, and ACCUPLACER tests were listed as potential tools for this purpose.

Another bill considered by the Alaska House Education Committee in 2010 would have required all high school seniors to complete a career assessment measuring aptitude in reading for information, locating information, and applied mathematics and if the student passed, he or she would be eligible to enroll in a postsecondary course as a secondary student (House Bill 206, 2010). Although this bill was not acted upon during the last legislative session, there is potential for legislative action in the future.

Summary

Concern over academic preparation of high school graduates has become a state and national issue which policymakers are addressing with testing mandates. ACT WorkKeys assessments are increasingly being used to address these concerns but they also provide test takers with results that can be used to further develop college- and career-ready skills. This study focused on collecting WorkKeys scores and survey data from high school students to describe student perceptions of college and career

readiness related to the WorkKeys assessments. The increased use of WorkKeys in education, new educational policy decisions which include WorkKeys, and the limited research on the use of WorkKeys in education provided significance to this study.

Chapter 2: Literature Review

At a February 2010 meeting of the National Governors Association (NGA), President Obama expressed the need for education standards to prepare students for college and careers (Obama, 2010). The President shared concerns that U.S. students were not performing as well as their peers internationally in math and science. In addition, proficiency rates on the National Assessment of Educational Progress (NAEP) and on college readiness measures such as the ACT college test indicated just over 50% or fewer high school juniors or seniors were prepared for college-level reading and math (ACT, Inc., 2009b; Planty et al., 2009). These indicators reinforced the governors' position on the need for college and career readiness for high school students.

The NGA first articulated the need for college and career readiness in 2004 when Virginia's Governor Warner became NGA chairman and unveiled his *Redesigning the American High School* initiative (National Governors Association [NGA], 2004). The purpose of the initiative was "to forge a national consensus on how high school students can get a jump on their college careers and enter the workforce with the skills needed for today's high-skilled jobs" (NGA, n.d., p. 1). This initiative included town hall meetings with business leaders, education leaders, parents, and students, and an action plan for states to redesign high school education. One recommendation for implementing the action plan was to "give college and work-readiness assessments in high school" (NGA Center for Best Practices, 2005, p. 13). Four states that were already conducting college- or work-ready tests in high schools

were highlighted, including Illinois where the ACT college test and WorkKeys tests were used as part of the Prairie State Achievement Examination (NGA Center for Best Practices, 2005).

Following Governor Warner's initiative, Achieve, Inc., a non-profit organization whose members included governors and business leaders, launched the American Diploma Project Network at the February 2005 National Education Summit (Achieve, Inc., 2005). This network began with 13 states and grew to 35 states focused on implementing programs and standards to improve high school education and prepare students for college and careers (Achieve, Inc., n.d.a). Previous educational reform efforts also called for increased high school graduation rates and skills to meet college or career standards, measured through voluntary use of state assessments (America 2000, 1991; Goals 2000, 1994; Secretary's Commission on Achieving Necessary Skills [SCANS], 1991). The ability of states to voluntarily assess student skills ended with passage of the No Child Left Behind Act of 2001 (2002), which created federal policy requiring performance accountability to be measured by standardized assessments. This has increased the use of assessments in education at all levels to provide evidence of academic achievement.

In an effort to meet calls for high school reform and demonstrate accountability for student achievement, several states have begun using the ACT WorkKeys assessments as a measure of college and career readiness (ACT, Inc., 2011). WorkKeys Reading for Information and Applied Mathematics assessments are currently required in Illinois and Michigan as measures of high school academic

achievement (ACT, Inc., 2011); Alaska required use of these assessments along with the Locating Information assessment beginning with the 2010-2011 school year (Alaska Career Ready, 2011). In addition, Alaska and North Dakota have statewide scholarship programs that include WorkKeys results as one eligibility criterion for students seeking education after high school (Alaska Commission on Postsecondary Education, 2011; North Dakota Department of Public Instruction, n.d.). Given the recommendations by the National Governors Association Center for Best Practices et al. (2008) for curriculum and external assessments that measure college- and career-ready skills and the inclusion of WorkKeys in scholarship programs, other states may also choose to administer WorkKeys assessments to high school students.

WorkKeys assessments are part of a system developed by ACT, Inc. in the early 1990s in response to the National Commission on Excellence in Education's report, *A Nation at Risk* (McLarty & Vansickle, 1997). The Commission was formed by the U.S. Secretary of Education to address concerns about the academic achievement of high school youth necessary for the U.S. to remain economically competitive. At the time, high school students' standardized achievement test scores were at a 26-year low and business leaders complained of the increased cost of remedial training programs for reading, writing, and math (National Commission on Excellence in Education, 1983). ACT, Inc. designed the WorkKeys assessments to measure basic academic and workplace skills such as reading and math in a workplace context so that both educators and employers could use the results to determine proficiency of the test-

taker (McLarty & Vansickle, 1997). A more detailed description of the WorkKeys assessments is provided in a later section of this literature review.

In 2006, an award element was added to the WorkKeys system: a National Career Readiness Certificate (ACT, Inc., 2010b). This certificate is awarded to individuals who take the WorkKeys Reading for Information, Locating Information, and Applied Mathematics assessments and meet a specified score level. This certification of workplace skills in addition to measurement in core academic areas makes these assessments appealing to both educators and employers.

With the increased interest in using WorkKeys in education, there are many possibilities for research in this area. A review of literature provided a framework for research analyzing the use of ACT WorkKeys Reading for Information, Locating Information, and Applied Mathematics assessments in education and the college and career readiness perceptions of high school students related to these assessments.

Approach to the Literature

An initial Google Scholar search on WorkKeys provided few scholarly studies, with only one study by ACT related to transitioning from high school to college. Since the assessments are proprietary to ACT, the ACT web site was researched extensively and a representative of ACT was contacted to obtain further information about the WorkKeys assessments and their use in education. The Anchorage School District also provided WorkKeys materials used in pilot testing the assessments during the 2009-2010 school year.

To gather research on testing and high school students' perceptions of college and career readiness, a search of the scholarly literature was conducted using EBSCOHost, Academic Search Premier, ProQuest, and ERIC databases as well as Google Scholar. The search was based on a combination of the following keywords: assessment, standardized tests, college readiness, achievement, perceptions, student outcomes, skills gap, careers, career development, career readiness, self-efficacy, and educational aspirations. Results were sorted based on the following broad themes: (a) college readiness; (b) career development; (c) career readiness; and (d) self-efficacy.

The initial search results identified numerous articles related to secondary school reform, however, they were narrowed to only those that specifically reported on assessments as they related to college readiness or career readiness. Transition studies that focused on factors other than academic or career measures were excluded. Although the present study focused on high school students, studies which addressed self-efficacy of elementary students, college students, or adults were considered in order to better understand the construct of self-efficacy and how it might relate to this study.

Overview of the Literature

The review of the literature is presented in four sections: (a) a detailed description of ACT WorkKeys assessments and relevant research; (b) career readiness; (c) college readiness of high school students; and (d) the concept of self-efficacy and its influence on college and career readiness. The detailed description of WorkKeys assessments provides context for the use of the assessments in both

education and workplace settings. This section also presents summaries of WorkKeys research and its relevance to this research study. The career readiness and college readiness sections provide definitions of the terms and research connecting these concepts to WorkKeys. Finally, the section on self-efficacy adds a theoretical basis to support the main hypothesis of this study that a test such as WorkKeys can influence the perceptions of high school students regarding their academic achievement and therefore college and career readiness. The career development theories that evolved from self-efficacy theory provide additional theoretical foundations and research related to career readiness specifically.

WorkKeys assessments. The ACT WorkKeys assessment system was intended to provide information that would indicate the relationship between an individual's education and the skills needed for employment.

By showing individuals a direct link between their education and training and their ability to qualify for jobs, and by providing them timely and accurate feedback on their progress in acquiring generic employability skills, WorkKeys is designed to have a positive effect on learner persistence and achievement. (McLarty & Vansickle, 1997, p. 294)

The WorkKeys system consists of job analysis or profiling to identify job skills, assessments to measure generic work skills, and training to improve skills or WorkKeys scores (ACT, 2007c). Although the job profiling and training components of WorkKeys provide information useful to test takers, the assessments are the key component on which this study focused.

The nine foundational WorkKeys assessments measure skills in the areas of communication (Business Writing, Listening, Reading for Information, Writing),

problem solving (Applied Mathematics, Applied Technology, Locating Information, Observation), and interpersonal skills (Teamwork) (ACT, Inc., 2007c); a description of each assessment is included in Appendix A. The assessments were designed specifically around workplace skills, with the skills to be measured based on a survey of employers and educators plus a review of existing literature on skill needs of employers (McLarty & Vansickle, 1997). Skill scales were designed, tested, and statistically analyzed to measure the content in a manner that was hierarchical so that results demonstrated mastery at a particular skill level. The skill scales at the lowest level reflect entry-level skills and at the highest level reflect skills at a level just below that of someone with specialized, job-specific training. The highest skill scale also does not typically require additional content knowledge but “the ability to use the content in more complex applications” (McLarty & Vansickle, 1997, p. 321). The skill level scores on the assessments match the skill levels used in the job profile analysis, providing a criterion-referenced score interpretation which allows a test taker to compare his or her score on a WorkKeys assessment with the skill level needed for a particular job. For example, if a student’s skill level score on Reading for Information is 5, that score matches the Reading for Information skill level needed by a dental assistant, medical assistant, and a retail salesperson as well as many other occupations (ACT, Inc., 2009a).

In addition to developing assessment scales to match job skills, WorkKeys developers crafted the assessments to measure generic skills in the context of the workplace. An advisory panel of employers and educators was used to identify the

skills to be measured and the level of difficulty of tasks included in each test item, which helped to ensure the validity of the assessments. Also, test item writers were individuals who had experience with the skills to be assessed (McLarty & Vansickle, 1997). Using individuals who had experience with the skills to be measured and developing questions based on job profiling provided content validity to the assessments.

Construct validity of the National Career Readiness Certificate assessments (Reading for Information, Locating Information, and Applied Mathematics) was analyzed using data from high school students in one midwestern state in 2002 (n=121,304) and 2003 (n=122,820) (ACT, Inc. n.d.). The correlation of WorkKeys Reading for Information to ACT Reading and English assessments ranged from .608 to .711, and correlation of WorkKeys Applied Mathematics to ACT Math assessments ranged from .71 to .81, indicating a moderate relationship between the number correct scores and the scale scores (ACT, Inc., n.d.). This correlation analysis appears to be the basis for identification of WorkKeys as an assessment that measures both college and career readiness.

In addition to the assessments, ACT, Inc. issues a National Career Readiness Certificate (NCRC) to recognize test takers' career readiness skills based on WorkKeys results. This certificate recognizes skills on Reading for Information, Locating Information, and Applied Mathematics and is awarded at a level commensurate with the test taker's score—a Level 3 score on each assessment earns a bronze certificate, Level 4 a silver certificate, Level 5 a gold certificate, and Level 6 a

platinum certificate (ACT, Inc., 2010c). These three WorkKeys assessments were selected as the basis for awarding the certificate because job profiling conducted by ACT identified these three skill areas as the most common in occupations across the United States (ACT, Inc., 2009a). The certificate serves as a signal to the test taker and employers of the individual's skill level on foundational employment skills. If the test taker seeks to improve his or her WorkKeys scores, training materials are available for remediation as well as test preparation (ACT, Inc., 2010b).

The research on development of WorkKeys indicated the assessments were specifically designed to measure workplace skills. The relationship of the scores to academic skills was less clear and further review of the literature was necessary before drawing any conclusions.

Research. A review of existing literature on WorkKeys assessments found that a majority of the research focused on the use of the assessments related to workforce development (Greene, 2008; Hendrick, 2006) or scores in relationship to test-taker characteristics (Barnes, 2002; Stone, 2007). This second area of research related to characteristics of test takers did provide some information useful to this study. In the study by Barnes (2002), the results of Reading for Information and Applied Mathematics WorkKeys scores of 1,634 examinees from high school through adults were analyzed to determine if scores differed based on gender, race, or educational level. Results of the ANOVA analysis indicated race and educational level were significant indicators of variability in WorkKeys results on Applied Mathematics and Reading for Information; no other WorkKeys assessments were

measured. The study was limited to one community in Alabama and only two ethnicities, Black and White, but it did indicate educational level had an impact on assessment results, which is useful to this study by suggesting that academic experience may influence the results.

A recent causal-comparative study of high school students' work readiness involved analysis of WorkKeys scores in relationship to student participation in a comprehensive high school career and technical education (CTE) program or a career academy (Hall, 2010). Results of the ANOVA analysis indicated significant differences between scale scores of comprehensive high school CTE students and career academy students, but the mean scores of each group fell within the same level scores of Level 4 on Locating Information and Levels 4 and 5 on Applied Mathematics and Reading for Information. The researcher concluded that the students were performing at the lower levels of work readiness on each of these assessments and there was a gap between students' skills and the level needed for work readiness.

Only two studies were found that focused on WorkKeys in relationship to college readiness. In the first study, the researcher (Bowles, 2004) used correlation and regression analysis to determine if there was a relationship between WorkKeys skill levels and ASSET college placement test scores of both high school students and adults. The participants included 71 new employees of a manufacturing company who took WorkKeys assessments as part of the hiring process and ASSET college placement tests as part of pre-employment training that articulated to the local community college, and 428 high school students who took both WorkKeys and

ASSET tests between July 2001 and June 2002. Analysis indicated only a moderate correlation between WorkKeys and ASSET scores ($r=.545$ for math, $r=.473$ for reading) and the ability to predict academic success using WorkKeys was very limited and problematic based on the wide score ranges for predicting success. Therefore, the use of WorkKeys for placement into standard academic courses was not recommended. While the results indicated the scores were not useful for college placement, other benefits of WorkKeys assessments may be revealed by asking high school students their perceptions of the assessments.

The second study that focused on WorkKeys related specifically to college readiness of high school students was conducted by ACT, Inc., the company that publishes WorkKeys assessments (ACT, Inc., 2006b). The researchers compared ACT college test scores and WorkKeys Reading for Information and Applied Mathematics scores of 476,847 Illinois high school juniors between 2001 and 2004. All of the assessments were administered as part of a statewide assessment program, the Illinois Prairie State Achievement Examination. The public research report on the ACT web site did not provide details of the analysis but footnotes indicated statistical analysis was conducted, including analysis of correlation between WorkKeys and ACT college assessments. The results indicated that a Level 5 Reading for Information test score corresponded to the ACT College Readiness Benchmark for Reading, and the Level 5 Applied Mathematics test score corresponded to a score one point below the score range for the ACT College Readiness Benchmark for Mathematics (ACT, Inc., 2006b, p. 10).

Initial review of this research by ACT, Inc. suggested that WorkKeys and ACT assessments could be used interchangeably. However, a statement by ACT researchers indicated that “scores on the two tests are not interchangeable” (ACT, Inc., 2006b, p. 10). In addition, the population used for the study should be considered a limiting factor for generalizing the ACT research results. Although a large sample was analyzed, each state is unique and the results in Illinois may not be representative of other areas of the country. Additional WorkKeys materials from ACT, Inc. were reviewed for research related to education, but no other studies were found.

Summary. The existing research on WorkKeys was limited, particularly in relationship to educational use with high school students. Other than the ACT study, the existing studies used small samples in single locations so results were not generalizable. The results did indicate, however, that educational level impacted WorkKeys results which suggests that academic experience leading up to testing could influence high school students’ results and perceptions of the testing experience. The research also provided insights into variables to be considered for this study such as gender and ethnicity, and college-ready score levels that could be used in analysis. Overall, the existing research indicated a gap in literature regarding the use of WorkKeys assessments with high school students and suggested that further research is needed regarding the use of WorkKeys as a measure of college readiness.

Career readiness. The definition of career readiness can vary depending on the context in which it is used. In career development literature, career readiness or vocational maturity refers to the readiness of the individual for the tasks involved in

making a career choice (Phillips & Blustein, 1994). This process of making a career choice is reflected in Super's lifespan career development theory which involves stages of career growth, exploration, establishment, maintenance, and decline over an individual's lifetime (Super, 1968). Throughout these stages, self-concept is the key factor interacting with abilities, interests, and experiences to influence career choices. When applied to high school students, ninth grade students are likely to be inconsistent in their career preferences but as they gain experience through high school, develop their self-concept, and approach the age when a career decision is needed, their career choices are more likely to be consistent around a career area (Osipow & Fitzgerald, 1996). In this context, career readiness is a developmental process.

In contrast, career readiness in the context of work skills refers to specific sets of skills employers seek in entry-level employees. It is also known as workforce readiness. The Secretary's Commission on Achieving Necessary Skills (SCANS) issued a seminal report in 1991 which identified the skills employers sought in young people entering the workforce (SCANS, 1991). The commission was appointed by Secretary of Labor Dole to address three challenges: (a) determine a common language for conversations between employers and educators about workplace skills; (b) set standards for the skills needed in the workplace; and (c) "assess and certify students' workplace readiness" (SCANS, 1991, p. 6). Through the work of six panels and researchers who explored skills in a wide array of jobs, the commission developed a set of skills and a set of competencies (Appendix B) that employers deemed essential

for successful job performance. The WorkKeys assessments of Reading for Information, Locating Information, and Applied Mathematics clearly align with the basic skills identified by SCANS.

More recent literature on career readiness continues to include basic academic skills of reading, writing, and math as fundamental skills for workforce readiness (Achieve, Inc. n.d.b; Association for Career and Technical Education, n.d.; Olson, 2007; The Conference Board, Corporate Voices for Working Families, Partnership for 21st Century Skills, & Society for Human Resource Management, 2006). However, emphasis on employability skills has shifted to skills employers identify as necessary for the 21st century. Employers across the United States who were surveyed about essential workplace skills identified professionalism/work ethic, oral and written communications, teamwork/collaboration, and critical thinking/problem solving (The Conference Board et al., 2006) as the four most critical skills in addition to reading, writing, and math that are necessary to be successful in the workplace of the 21st century. The core academic skills of individuals entering the workforce continue to be rated very important to employers but when asked specifically about skills of high school graduates, 72% of employers rated the graduates deficient in writing, 53.5% rated them deficient in mathematics, and 38.4% rated them deficient in reading comprehension, with deficient defined as “lacking or poorly prepared” (The Conference Board et al., 2006, p. 15). Similar concerns were reported in a separate survey of U.S. manufacturers. Of the 800 respondents, 84% reported that K-12 schools were not doing a good job of preparing students for the workforce (National

Association of Manufacturers & Deloitte Development LLC, 2005) and when asked to specify the areas in which student preparation was deficient, 55% reported basic employability skills (attendance, promptness), 51% reported math and science, and 38% reported reading and comprehension. These reports emphasize the importance of reading and math skills to meet employer expectations for entry-level workers.

In summary, it was evident from the existing survey research that core academic skills of reading, writing, and math are important to employers. The WorkKeys Reading for Information, Locating Information, and Applied Mathematics assessments clearly align with the foundational skill areas employers are seeking. Whether high school students perceive these to be important skills for employment and identify WorkKeys as a measure of these skills led to questions that framed this study.

College readiness. High school reform efforts and educational accountability have led to increased use of assessments and a plethora of data about student academic abilities. However, college readiness encompasses not only scores on national tests but high school grades, cognitive strategies, content knowledge, attitudes, and behavioral attributes (Conley, 2007). Despite the importance of these multiple components, the emphasis for this study was on the academic components of college readiness and their relationship to WorkKeys.

In a report prepared for the Gates Foundation, Conley (2007) defined college readiness as “the level of preparation a student needs to enroll and succeed—without remediation—in a credit-bearing general education course at a postsecondary

institution that offers a baccalaureate degree or transfer to a baccalaureate program” (p. 5). Standardized tests such as SAT and ACT are often used as predictors of college readiness (Baron & Norman, 1992; Cohn, Cohn, Balch, & Bradley, 2004) yet studies found that high school performance provided a better indicator of college readiness than standardized assessments. In a national longitudinal study, Adelman (1999) conducted detailed analysis of high school and college transcripts, test scores, and surveys over 11 years for students who were 10th graders in 1980. Through regression analysis, the research indicated the high school factor that contributed most to college persistence was academic intensity and quality of courses taken by students while in high school. This study supported findings of an earlier longitudinal study (Alexander, Riordan, Fennessey, & Pallas, 1982) which identified high school academic characteristics such as class rank and curriculum as the strongest predictors of college degree completion. A more recent mixed method case study found through regression analysis of 224 community college students’ high school records that those who tested out of developmental courses had higher GPAs in high school and took more mathematics during high school (Hay, 2005). The importance of academic preparation for successful transition to college was confirmed through interviews with 15 students in the same study. The interviewees indicated that less leniency on assignments and more academic rigor in high school would have better prepared students for college. Although this was a small study at one Midwestern community college, it does suggest implications for college readiness that align with other studies.

If WorkKeys assessment results encouraged students to take more rigorous courses, the existing research suggests this could contribute to college readiness.

Another study regarding factors affecting high school students' decisions about college was a longitudinal study conducted in Indiana from 1986 to 1994 (Hossler, Schmit, & Vesper, 1999). A cluster sampling approach was used to select ninth grade students and their parents for surveys. Over the span of nine years, students were surveyed at least once each year and a subset of 56 students and parents were interviewed. The researchers faced challenges with funding and response rates of students who did not plan to go to college, but the results are informative for the present study. The Indiana study found that two-thirds of students who had decided by ninth grade that they would attend college were enrolled in college within one year after high school graduation. The other one-third of students who were undecided may have been influenced by various factors during high school. The research indicated that support and encouragement from parents had the greatest influence on student aspirations for college, followed by academic achievement and parental level of education (this was found to be a weak variable in Adelman's [1999] larger study). The researchers also studied informational needs of high school students regarding college and found that career information related to their areas of interest was one of the top three types of information sought by students. This research supports the importance of high school academic performance on college aspirations and suggests that occupational information provided through results of the WorkKeys assessments might be of interest to test takers in determining future plans.

Of particular interest to this study was literature that addressed student perceptions of standardized assessments and any relationship to educational outcomes. Standardized assessments refer to “any examination that’s administered and scored in a predetermined, standard manner” (Popham, 1999, p. 8), and include achievement tests. In one state-level study, Perna and Thomas (2009) examined 15 high schools in five states to determine the effect of state mandated high school exit exams on key factors in college enrollment such as students’ academic achievement and high school graduation. College enrollment predictors were identified through review of research and used to analyze the data. The results of this case study indicated that students perceived low test scores as a barrier to college enrollment and that passing the high school exit exams did not ensure students were prepared for college because tested curriculum was not rigorous. Although this study used multiple sources for collecting data, the results presented were based almost entirely on interviews with students, parents, teachers, and counselors, and due to the small sample size results could not be generalized. The results of this study suggested that further research on testing and the influence of results on student perceptions for college planning was a worthwhile endeavor and the use of the mandated WorkKeys assessments could add to the literature.

Another study conducted in New Zealand by Brown and Hirschfeld (2008) identified individual student perceptions of standardized assessments and the effect on educational outcomes. Responses regarding conceptions of assessment were gathered from 3,469 secondary school students using a self-report questionnaire that was

administered in two forms as part of a standardized reading assessment. The questionnaire measured the level of student agreement with four possible perceptions of assessment: (a) it makes students accountable for their learning; (b) it makes schools accountable; (c) it is fun; or (d) it is irrelevant. After eliminating participants who responded to less than 90% of the survey items, analyzing for inter-correlations between the forms, and analyzing correlation of student conceptions with reading achievement, the results indicated the perception that “assessments make students accountable” was positively related to achievement outcomes. In other words, student perceptions of standardized assessments had a positive impact on educational outcomes. The use of surveys to determine student perceptions on assessments also supported the survey methods used in this study.

Other researchers (Paris, Roth, & Turner, 2000) studied student perceptions of standardized assessments to address concerns that students’ attitudes and motivation toward assessments were negatively impacting the results and therefore the validity of the standardized test scores. The first in a series of three studies surveyed 1,974 students in four states from grades 2-11 who took one of the following tests: California Achievement Test (CAT), Stanford Achievement Test (SAT), Iowa Test of Basic Skills (ITBS), or the Comprehensive Test of Basic Skills (CTBS). Students were asked to rate their agreement with statements about the achievement tests on a five-point Likert scale, from strongly agree to strongly disagree, and responses were grouped into four age levels of early elementary, upper elementary, middle school, and high school. Results of one-way ANOVA analysis of each survey item across age

groups indicated significant differences between older and younger students. Older students indicated they were less motivated to do well on the tests than younger students and they gave less than their best effort. Older students also had a higher level of disagreement that the tests were a reflection of their intelligence and abilities as a student, and indicated the use of the test results was not clearly communicated. Additional analysis of the data using value and affect scales indicated student perceptions about the value of the tests decreased as the students got older. Because this study used several different assessments in different states, two additional studies were conducted to confirm the results. The next study was conducted with a random sample of 240 4th, 7th, and 10th grade students in one community who took the Michigan Educational Assessment Program (MEAP) reading test. Students responded to a survey of 54 items, indicating level of agreement on a 4-point Likert scale with statements regarding various aspects of the MEAP test. The results of one-way ANOVA analysis indicated most students tried hard and thought they did well, but a higher percentage of older students had negative perceptions of the achievement tests, attributed little importance to the results, and admitted to negative test-taking behavior such as randomly filling in bubble sheets. This study also analyzed differences among high and low achieving students and found significant differences with six items, indicating high achievers were more likely to have positive perceptions of the tests and less likely to report negative test-taking behaviors than low achievers.

The final study in the series was conducted to determine if older students' negative attitudes about testing were due to general discontent with school. Fifth and

eight grade students from the same community as the second study were surveyed about their perceptions of the CAT test they had recently taken and classroom tests taken at the end of a chapter or unit. Once again, ANOVA analysis was used and results indicated that older students viewed classroom tests as more important than younger students. The older students also reported more negative views of standardized assessments and perceived them to be less important than younger students. This series of studies provided research for comparison with student perceptions of WorkKeys assessments as well as possible methods and procedures for use with this WorkKeys study.

In summary, the research on college preparation and readiness of high school students indicated that the rigor of the high school curriculum and individual student performance in high school are important factors in determining students' college readiness. This led to inclusion of high school performance as a factor to consider along with WorkKeys results in exploring student perceptions of their college readiness. The studies also supported the use of survey design in gathering student perceptions related to WorkKeys. In addition, the research suggested that the career information provided along with the WorkKeys results may be of interest to high school students and provide relevance to the assessment results. However, since students were not provided with career information sessions based on WorkKeys results prior to completion of the survey, questions about the influence of WorkKeys on career choice were not included in this study. Finally, the research on student

perceptions of standardized achievement tests supported the value of pursuing a study of high school student perceptions related to WorkKeys assessments.

Self-efficacy. The construct of self-efficacy provides a foundation for understanding high school students' perceptions of academic achievement and associated behaviors that prepare them for continuing education or entry-level work. It was developed within social cognitive theory as a factor that guides personal agency or self-regulated actions. Self-efficacy encompasses all aspects of self that influence behavior and is defined as confidence in one's ability to perform a given task or activity with desired results (Bandura, 1986, 1997; Pajares, 1996). Although it may seem straightforward, self-efficacy is a multi-dimensional construct that involves: a) level or difficulty of a task, b) generality, which refers to transferability of efficacy beliefs among different tasks, and c) strength, which refers to the certainty one has in his or her ability to perform a task (Zimmerman & Cleary, 2006). These factors interact to determine whether someone engages in a task or avoids it. A task around which self-efficacy can be applied in this study is the WorkKeys testing situation, where the difficulty of test items and efficacy beliefs based on previous assessment performance are dimensions that could influence students' self-efficacy beliefs about their WorkKeys performance.

In addition to the focus on ability to perform a task, another distinguishing characteristic of self-efficacy is its basis on mastery performance where the individual considers his or her own abilities within the context of the situation, whereas self-concept is based on comparison to others (Zimmerman & Cleary, 2006). Bandura

(1997) identified three other sources of information that influence development of self-efficacy—vicarious experiences (modeling), verbal persuasion (encouragement), and physiological reactions (such as fear or anxiety)—but of the four, “enactive mastery experiences are the most influential...because they provide the most authentic evidence of whether one can muster whatever it takes to succeed” (p. 80). In an academic setting, performance on class assessments as well as standardized assessments can be perceived as mastery experiences that impact students’ self-efficacy.

Yet the experience alone is not enough to enhance self-efficacy. It is the cognitive processing that goes along with it, the reflective thinking about the experience and integration into self-appraisal that enhances self-efficacy (Bandura, 1997; Zimmerman & Cleary, 2006). If upon reflection an experience results in a positive outcome or consequence, one’s feeling of competence is improved and the behavior that led to the outcome is more likely to be repeated. Thus, positive outcome expectation is integrated with self-efficacy and contributes to behavior in a given situation.

Integrating a positive new experience with past mastery performance increases self-efficacy and confidence in accomplishing a task or achieving a desired outcome. This confidence is reflected in behavior through approach toward a task, level of performance, and persistence (Betz, 2007). In an academic context, an individual with high math self-efficacy, for example, is likely to consider math as a choice rather than something to avoid. The individual is also likely to perform well on skill assessments

in math because he or she is more likely to persist and try alternate strategies when challenged with a problem (Bandura, 1986). In this way, self-efficacy enhances academic achievement.

The relationship between self-efficacy and academic achievement has been measured in the past with testing situations. Research on high-stakes testing and self-efficacy, self-regulation, goal orientation, and worry indicated a positive relationship between math self-efficacy and math achievement measured by an Advanced Placement calculus exam (Malpass, O'Neil, & Hocevar, 1999). Research has also shown a relationship between low self-efficacy and low levels of achievement on tests. In a study conducted with 102 middle school students in the Chicago Public Schools (Roderick & Engel, 2001), low-achieving students were less likely to feel prepared for grade promotion tests because the tests were too difficult or the students did not know the material. The research suggested other factors may have contributed to the low self-efficacy and achievement but also indicated that providing specific learning goals and assistance to direct students' learning could have a positive impact on student efforts in school. Put in the context of WorkKeys testing, using the results to aid students in setting learning goals related to a career of choice may encourage students to increase their efforts and take more rigorous classes.

Numerous studies of self-efficacy have also been conducted with results indicating self-efficacy has a direct influence on academic achievement, regardless of a student's cognitive ability (Zimmerman & Cleary, 2006). Research in the areas of math (Bandura & Schunk, 1981; Malpass et al., 1999; Pajares & Graham, 1999) and

science and engineering (Lent, Brown, & Larkin, 1984, 1986) indicated a positive relationship between self-efficacy and academic achievement, and a meta-analysis of 39 research studies regarding self-efficacy confirmed these results (Multon, Brown, & Lent, 1991). The research suggests that students with higher self-efficacy related to an academic subject area are more likely to have higher grades and persist than those with low self-efficacy in the subject area, even when their ability levels are similar. While self-efficacy is not being measured in this WorkKeys study, the significant relationship between self-efficacy and academic achievement suggests that this construct may be an underlying factor in student perceptions of college and career readiness.

Self-efficacy and career development. The relationship of self-efficacy to career development is a relatively recent addition to career development theory (Lent, Brown, & Hackett, 2002). While previous theories such as Super's self-concept development theory proposed that an understanding of one's self had an influence on career choice (Super, 1968), theory based on self-efficacy recognizes additional factors that influence career development. The theory that outlines the relationship of self-efficacy to career development is social cognitive career theory (SCCT), which is based on Bandura's social cognitive theory and Krumboltz's social learning theory of career decision making (Lent et al., 2002). SCCT posits that self-efficacy, outcome expectations, and interests are the key variables in determining the career choice goals and actions of an individual, and that personal variables such as race, gender, and socioeconomic status are intertwined with these social cognitive variables and the

career development process (Betz & Hackett, 2006; Lent et al., 2002). This theory provides a foundation not only for determining an individual's interest in careers but also for academic pursuits.

In the context of the present study, SCCT provides a framework that connects WorkKeys and its potential impact on students' self-efficacy with the outcome expectations related to entering college and the workplace with adequate skills. In addition, SCCT suggests it is important that "...career-related outcome expectations are based on accurate information" (Lent et al., 2002). WorkKeys may be a tool to provide students information they need to more accurately connect their abilities with careers.

Research regarding the application of SCCT to career interests indicated that self-efficacy had a significant relationship to career choice. In their initial study of self-efficacy related career choice, Betz and Hackett (1981) used questionnaires to measure self-efficacy of college freshmen regarding educational requirements for entering a selected set of occupations and self-efficacy related to job duties of the occupations. Through regression analysis, they found that self-efficacy was significantly related to occupational choice for both males and females, and that there were gender differences in self-efficacy related to traditional and non-traditional occupations. One additional finding with application to this study was that ACT math and English scores were not significant predictors of the range of occupational choice and only moderately related to self-efficacy with regard to traditional and non-traditional occupations. A later study (Lent et al., 1986) with college undergraduates

interested in science and engineering majors provided similar results, with regression analysis indicating self-efficacy as a significant predictor of grades, persistence, and career options. In a more recent study with middle school students in Rome (Bandura, Barbaranelli, Caprara, & Pastorelli, 2001), academic self-efficacy was found to have the most direct influence on occupational efficacy, and occupational efficacy influenced career choice as well as level of occupation within a career area. The authors of this study also pointed out that middle school students find little connection between past academic achievement and occupational choice; it is self-efficacy that is most influential.

In addition to the influence of self-efficacy on career choice, researchers have also studied the influence of self-efficacy on the career decision-making process. A scale was developed by Taylor and Betz to measure an individual's belief about his or her ability to successfully complete the tasks necessary for career decision-making (Leong & Walsh, 2008). This Career Decision Self-Efficacy Scale (CDSE) measures career decision-making competencies in five areas: a) self-appraisal, b) occupational information, c) goal selection, d) planning, and 3) problem solving. The instrument has been validated through research studies, mainly with college students (Nilsson, Schmidt, & Meek, 2002; Zunker & Osborn, 2002), and has been used to correlate self-efficacy with career indecision, career exploration behavior, and other attitudes and skills related to career decision-making (Nilsson et al., 2002). While the present WorkKeys study did not use the CDSE scale, the five competencies measured by the instrument suggest that WorkKeys results and occupational profiles might be useful

for self-appraisal of skills and occupational information related to those skills, and interventions to interpret this information might address goal selection, planning, and problem solving competencies.

Summary. The literature on self-efficacy suggests that academic self-efficacy has a greater impact on college and career choice behaviors than academic performance alone and is an important construct to consider when determining policies and interventions that encourage college and career readiness. New experiences can either enhance, maintain, or diminish self-efficacy of students and although this study does not attempt to measure self-efficacy, gathering student perceptions could indicate whether self-efficacy might be influenced by the WorkKeys testing experience which could then lead to further studies.

The self-efficacy literature also provided insights into developing this research study. Survey items were constructed using a Likert scale, as this format was used in the self-efficacy studies, and were written with self-efficacy in mind. Based on research results that indicated academic behaviors differ between students with high and low academic self-efficacy, the analysis of survey results were group by high and low achieving students as measured by college-ready WorkKeys scores to determine if their perceptions differed.

Career development theories also provided important information for understanding how WorkKeys results might impact career readiness perceptions of high school students. Social cognitive career theory in particular suggested that results of WorkKeys assessments alone may have no impact on career choice, as they are

standardized assessments like ACT tests which were not a significant predictor of career choice. However, it was clear from the literature that self-efficacy has an impact on both academic achievement and career choice, and asking students about their perceptions of WorkKeys may be an indication of whether these assessments could influence self-efficacy.

Finally, the five career decision-making competencies identified by the Career Decision Self-Efficacy Scale suggest that WorkKeys results might enhance career decision-making through self-appraisal, and interventions that use the results along with related job profiles might address occupational information, goal setting, planning, and problem-solving competencies. Engaging students in this manner could lead to behaviors that prepare them for college and careers.

Summary of Literature

In considering research related to high school students' perceptions of college and career readiness, theories involving self-efficacy and career development provided constructs used to measure student perceptions of college and career readiness. The research on self-efficacy in particular provided insights helpful to planning the proposed research and developing survey questions. It was evident from the self-efficacy research that academic performance outcomes, behaviors, and self-efficacy have a reciprocal relationship that influences student perceptions related to college and careers. Also, most of the self-efficacy studies involving surveys used Likert scales for question responses, suggesting the use of this design for the present study.

The literature on college readiness suggested that studying the impact of the WorkKeys assessments on high school students would provide valuable information to policymakers seeking to improve academic achievement. The research suggests it is course-taking rather than assessments which have the greatest impact on college readiness. High school course taking then becomes a factor to consider regarding students' perceptions of college readiness in addition to WorkKeys results.

The literature on college readiness and self-efficacy also provided insights into methodology. Much of the literature reviewed used survey methodology, which is the method used for this research study. The career decision-making self-efficacy studies also used Cronbach alpha to test reliability of the survey instruments, suggesting it as an appropriate test for this study.

Although the literature on the use of WorkKeys in education was limited, recent studies suggested this is a growing area of research. The studies that included high school students focused on WorkKeys scores as indicators of college or work readiness, and identified benchmark scores for college readiness. The present study will add to the literature by looking beyond the scores and describing high school students' perceptions of college and career readiness.

Chapter 3: Research Methodology

Alaska education policy mandating WorkKeys testing of high school juniors provided a unique opportunity to conduct exploratory research. While previously cited studies of WorkKeys focused on scores and variables affecting the scores or comparisons to other standardized tests, the purpose of this study was to gather and analyze the perceptions of Alaskan high school juniors regarding college and career readiness as they related to the WorkKeys assessments. This chapter describes the research design selected for this study, participant and site selection for the study, development of the survey instrument, efforts to address validity and reliability of the instrument, procedures to conduct the study and analyze the data, confounding factors, and limitations of the study.

Research Design

The mandatory statewide administration of WorkKeys assessments in Alaska occurred for the first time in November 2010 and this study provided the opportunity for initial analysis of the assessments. A number of different research designs could have been selected to gather and analyze data for this first test administration. This researcher approached the study with a post-positivist view of gathering objective data to describe high school student perceptions related to WorkKeys testing, which aligned with the assumptions of quantitative methodology (Creswell, 2004, 2008). In addition, quantitative survey design was identified as the method appropriate to describe “the attitudes, opinions, behaviors, or characteristics of the population” (Creswell, 2008, p. 388). A cross-sectional survey design was appropriate for this

study because student beliefs and opinions were gathered at one point in time, four months after completing the WorkKeys assessments. Therefore, a quantitative research method with a cross-sectional survey design was selected for this study to gather and describe high school student perceptions of college and career readiness related to WorkKeys assessments.

Participant and Site Selection

One of the first steps in operationalizing the research study involved identifying the population, type of sample, and sample size for the study. Because of the Alaska education regulations regarding administration of WorkKeys assessments during the 2010-2011 school year, the population for this study could have been all Alaska high school juniors who completed the WorkKeys Reading for Information, Locating Information, and Applied Mathematics assessments, or approximately 10,000 students (Alaska Department of Education and Early Development [DEED], 2010). Although a statewide study would have been ideal, access to students across the state was beyond the resources of this researcher. The Anchorage School District provided a viable option because it was accessible to the researcher and had a diverse student population. It is also the largest school district in the state and provides leadership in statewide educational initiatives. The Anchorage School District Director of Assessment and Evaluation was consulted in April 2010 to determine whether the school district would be receptive to providing a sample for the research. She indicated the research would be valuable to the school district and suggested individuals to contact in order to continue moving forward with the study. Based on

the positive outcome of that meeting, the sample was selected from the Anchorage School District juniors, which included approximately 3,700 students (Alaska DEED, 2010).

The preferred method of sample selection was a form of probability sampling because it would provide a sample representative of the population and generalizations could be made to the population based on the study (Creswell, 2008). However, school district policies and procedures dictated access to students and the sampling method. First, permission to administer the surveys had to be obtained from the comprehensive high school principals. This researcher worked closely with Anchorage School District central office administrators to gain permission of the principals and access to the high schools, particularly those with student populations that reflected the diversity of the entire school district. Based on meetings with school administrators, two high schools initially agreed to participate in the study, but one later withdrew.

Second, school district policies regarding survey research by outside entities had to be followed. The policies did not allow for research that identified individual students, making it difficult to single out individual students as part of a random sample. Therefore, with the approval of school district administrators, a convenience sample consisting of all juniors at one high school was used for this study.

Survey Instrument Design

The design of the survey was determined by a number of factors, including the audience completing the survey, the time available for respondents to complete the

survey, the number of respondents, and the range of possible answers to the questions (Russ-Eft & Preskill, 2001). With the sample consisting of high school students, a short survey with close-ended questions was chosen because of the ease of completion and the short amount of time it would take, which would positively influence the response rate. A survey with close-ended questions limited students to the responses provided but was also the most efficient way to collect data from the targeted sample of over 400 students.

Determining the best design for the survey was also based on the process of survey administration that would work best for school administrators and staff, and facilities available. Initial discussions with the Director of Assessment and Evaluation identified two options for the survey: a paper survey with a Scantron form administered in the classrooms, or an electronic survey sent to student email accounts. The high school administrators determined that an electronic survey administered in the computer labs would be the most efficient means to gather the data and would involve minimal staff time. It also assured a better response rate and more anonymity than a survey sent to student email accounts.

Developing the instrument. Several existing surveys measuring college and career readiness were reviewed for this study. One survey, the College Survival and Success Scale, was designed “to measure a person’s knowledge and attitude about the skills needed for college survival and success” (Carty, 2007, p. 248). It used a 4-point Likert scale from “a lot like me” to “not like me” which did not address self-efficacy beliefs. It also addressed only non-academic factors and was not considered to meet

the Standards for Educational and Psychological Testing. Another survey, the Vocational/Educational Self-Efficacy Scale (VESES), was developed specifically for a pilot study of low socioeconomic status ninth graders to measure their confidence in abilities related to attending college, technical training, or obtaining a job (Ali, McWhirter, & Chronister, 2005). This survey used a 10-point Likert scale and included items related to specific skills, such as obtaining information about how to apply to college or obtaining information about industry certifications. While self-efficacy related to college and careers was part of the theoretical foundation of this study, it was not the central focus and therefore the VESES was not used. Finally, a review of career related surveys led to instruments that ranged from aligning participants' interests with career clusters to measuring their skills at career decision-making. No survey instruments were found to measure both college and career readiness perceptions related to an assessment so a survey specific to this study was developed.

The review of literature on self-efficacy and career development provided insights regarding the type of questions to use. The self-efficacy studies used questionnaires with statement responses on a Likert scale (Malpass et al., 1999; O'Neil, Sugrue, Abedi, Baker & Golan, 1997; Pajares & Graham, 1999) and many of the career development assessments used a Likert scale for responses as well (Zunker & Osborn, 2002). A Likert scale provides close-ended questions, which are easier for respondents, but includes a continuum of response choices (Salant & Dillman, 1994). A typical Likert scale measures intensity of attitudes or opinions with a scale ranging

from 1 to 5, with 1 indicating “strongly disagree” and 5 indicating “strongly agree” (Nardi, 2003; Neuman, 2003). When an odd number is included on the scale, there can be a tendency by those completing the questionnaire to select the middle item (Nardi, 2003; Russ-Eft & Preskill, 2001). Based on this information, a Likert scale with a response range from 1 to 4 was used to prevent a middle or neutral response option.

The self-efficacy studies and career development inventories also provided insights into wording for the questionnaire. Direct “I” statements were used in addition to statements that specifically addressed confidence of the respondent (Malpass et al., 1999; Pajares, 1996; Pajares & Graham, 1999). The literature also indicated that careful wording on the questionnaire was important for reducing measurement errors (Salant & Dillman, 1994). To minimize this type of error, the survey was carefully constructed to include instructions and items that were understandable for high school students answering the questions. A copy of the survey is attached in Appendix C.

Survey reliability and validity. To ensure reliable and valid results, the survey instrument was carefully constructed to avoid factors that could cause measurement errors, such as “inadequate sampling of the items used to measure a particular concept” (Russ-Eft & Preskill, 2001, p. 188). The survey instrument included four questions related to college readiness and the same number of questions related to career readiness to help minimize errors. The literature also suggested that statistical analysis with the use of the Cronbach alpha be applied to determine the

internal reliability of an instrument that used a Likert scale and was administered only once (Isaac & Michael, 1995). Some psychometricians believe that the Cronbach alpha test is misused as a test of reliability, stating that it can either underestimate or overestimate reliability depending on the underlying assumptions that might be violated (Huysamen, 2006; Sijtsma, 2009). Other experts suggest that if items are closely related and the scale is well-constructed with more than 4 items, bias resulting from use of alpha would be minimal (Green & Yang, 2009). Given the differing opinions on the use of Cronbach alpha, the results of the literature review on self-efficacy indicating widespread use of Cronbach alpha as a measure of reliability (Nilsson et al., 2002), and the design of this study it was determined that the Cronbach alpha test would be applied to the survey. This test must be applied to items with similar response types and number of response choices, which made it applicable to only those survey items that had these similarities. The results of the reliability tests are included in the data analysis section of this chapter.

Three types of validity—content, criterion-related, and construct—were considered in development of the survey. Content validity required that questions on the instrument capture the meaning of the constructs identified in the research questions (Neuman, 2003) and be based on literature related to the concepts of interest (Russ-Eft & Preskill, 2001). Multiple survey items were included for each of the constructs of college readiness and career readiness. With little WorkKeys research on which to base question development, research on self-efficacy, college readiness, and career development provided the theory and content from which to develop

questions. Content validity may also be enhanced by asking a panel of experts to review survey items. To strengthen validity, the survey was emailed to the Alaska Department of Education and Early Development staff person previously responsible for WorkKeys testing, and to a high school counselor who was familiar with the WorkKeys assessments. The researcher's advisor also served as an expert and reviewed the survey items, as did the Evaluation and Assessment Coordinator for the Anchorage School District. The following changes were made to the survey:

- Deleted three statements about taking different high school courses than previously planned based on WorkKeys results. These statements were determined to be too specific for the purposes of this study.
- Deleted two questions asking for the respondent's grade in his or her most recent English and math classes. The question about overall GPA was deemed sufficient for the purposes of this study, making these questions unnecessary.
- Deleted the statement, "My WorkKeys results indicated I have the skills needed to pursue the career I had planned." This statement was similar to another career readiness statement and did not have a parallel statement for the construct of college readiness.
- Changed the statement, "My WorkKeys results caused me to *reconsider* my education options after high school," to, "My WorkKeys results caused me to *rethink* my education options after high school" to make the wording more student friendly.

- Changed the statement, “After reviewing occupations related to my WorkKeys skill levels, I am considering new career options,” to, “My WorkKeys results caused me to consider career options I had not thought about before.” The original statement assumed students would be comparing results to occupational profiles and it was not certain that was part of the process implemented in the school district.
- Added two parallel negative statements, “There is no connection between my WorkKeys results and my education after high school,” and “There is no connection between my WorkKeys results and my career plans,” to test reliability of responses.
- Added a score category of Less than 3 since that score was possible but missing from the survey.
- Added a set of statements about confidence in English skills before and after taking WorkKeys.
- Added a set of statements about confidence in math skills before and after taking WorkKeys.

Criterion validity, or “correlation between measurement and criterion” (Russ-Eft & Preskill, 2001, p. 187), was also considered in this study, not for the survey instrument itself since no other validated surveys were found with which it could be compared, but to the WorkKeys assessments and their correlation with college and career readiness. One study comparing the WorkKeys Level 5 scores with ACT test college benchmark scores suggested a correlation but no statistical analysis was

included in the report, only a statement of “statistical concordance” (ACT, Inc., 2006b, p. 10). The same report also stated that “476,847 high school juniors in Illinois...took the ACT, the WorkKeys Reading for Information Test, and the WorkKeys Applied Mathematics Test between 2001 and 2004” (p. 10) and the scores were statistically aligned to “determine how workforce training readiness compares to college readiness” (p. 10). More details regarding the research methods used and the statistical analysis would provide stronger evidence of the correlation and validity of WorkKeys as a measure of college and career readiness.

Construct validity, or determining whether the survey measured what it was supposed to measure, was not established in this study because the survey was administered only once. When the constructs measured are abstract, multiple administrations of the survey are needed for construct validity to be established (Creswell, 2008).

A pilot study was conducted to enhance the validity and reliability of the survey. The literature suggested up to 10 people as a good number for a pilot study (Russ-Eft & Preskill, 2001). It was important for this study that the individuals in the pilot study be high school students who were familiar with the WorkKeys assessments. Students from an accredited special purpose high school in Anchorage where students have been taking WorkKeys assessments for several years were selected for the pilot study. Parent permission was received for three students who completed the survey and then responded to questions about clarity of statements and suggestions for improvement. Based on feedback from these students, no further

changes were made to the survey. One student did indicate, however, that the college readiness questions led her to think more about how WorkKeys might help her with college.

Data Collection

The Anchorage School District has specific guidelines for external entities conducting survey research with students so those guidelines along with school administrators' approved procedures determined data collection procedures for this study. WorkKeys assessment scores were needed to measure relationships between assessment scores and perceptions, and GPA as a measure of academic performance. School district guidelines prevented personally identifiable information such as WorkKeys scores or GPA from being shared without parent permission, and outside surveys requiring parent permission are not allowed. Therefore, students were asked to self-report their WorkKeys scores and their current GPA on the survey. High school student perceptions about college and career readiness based on the WorkKeys results were measured by the survey questions constructed for this purpose. Demographic data such as gender and ethnicity was also self-reported on the survey.

Survey Administration

Prior to survey administration, steps were taken to follow school district guidelines for survey research. Individual parent permission slips were not required because student responses to the survey were anonymous. However, parents were required to be notified about the survey and to receive a copy two weeks in advance of the survey administration. The Bartlett High School newsletter for February included

a letter to the parents with consent information as required by the school district (Appendix D) and was posted to the school's web site on February 3, 2011 with a link to the online survey using the Oregon State University BSG electronic survey tool.

The survey was administered as part of a WorkKeys assembly for high school juniors at Bartlett High School on February 17, 2011. This was a parent-teacher conference day which meant only a half day of school and a bell schedule with shortened classes. The assistant principal indicated that attendance would be lower than normal due to the half day of school.

As the juniors entered the auditorium, they received their WorkKeys results, a Career Readiness Certificate if one was earned, and an informational letter from the researcher about the WorkKeys survey (Appendix E). The assembly opened with a presentation about WorkKeys and the Career Readiness Certificate (CRC) which students received if they scored at Level 3 or higher on each of the assessments. One student was brought to the front and recognized for earning a Platinum CRC, which meant he scored at Level 6 or higher on all three assessments. The school administrators also provided this researcher with a few minutes to explain the purpose of the WorkKeys survey and to read through the informational letter with the students. Students were then separated into groups of 25 and sent with an adult supervisor to computer labs to complete the online survey instrument. Once in the computer lab, students logged on to the school web site, selected the survey link, and completed the survey. If all juniors had been in attendance that day, the potential sample size would have been 427. With students absent and some students not able to complete the

survey (they had not taken the assessments or their parents did not give their permission at the beginning of the school year to participate in surveys), a total of 178 students completed the survey.

Strategies to Protect Human Subjects

Every effort was made to follow Oregon State University and Anchorage School District guidelines for protection of the high school students involved in this study. This researcher completed the Collaborative Institutional Training Initiative (CITI) Human Research Curriculum to ensure understanding of the ethical guidelines for conducting research with human subjects and obtained permission from the Oregon State University Institutional Review Board (IRB) and the Anchorage School District Office of Assessment and Evaluation prior to conducting research activities. Surveys were constructed so that no personally identifying information was required and were administered online in a large group setting, maintaining anonymity of the student participants as required by the Anchorage School District.

Data Analysis

Use of the Oregon State University BSG electronic survey tool allowed student responses to be collected by the survey software and downloaded to a Microsoft Excel file for analysis. No personally identifying information was included in the survey results, maintaining anonymity of the student respondents as required by the Anchorage School District.

To increase validity of the data, the survey responses were analyzed to identify students who left portions of the survey blank. This research study focused on college

and career readiness related to WorkKeys, therefore, students who did not respond to the items in Question 8 regarding college readiness or Question 9 regarding career readiness were deleted from the data. In addition, two other students were deleted from the data because they both indicated scores of Level 6 on all three assessments, yet the school only recognized one student for achieving results at this level. Since this survey was anonymous and it was not clear which student was validated by the school staff for scoring at this level, both students were deleted from the data. Of the 178 original respondents, 173 remained in the data set and they provided responses to 90% or more of the survey items.

The statistical functions of Microsoft Excel, VassarStats online statistical calculators, and SPSS were used to analyze the data collected from the student surveys. The Cronbach alpha test was applied to Questions 8 and 9 as a measure of internal consistency reliability. Responses to negative statements were reversed and results indicated $\alpha=.613$ for the four college readiness statements (Question 8) and $\alpha=.659$ for the four career readiness statements (Question 9). If the assumption is made that college and career readiness are the same, then responses could be combined and provide more than four items on which to measure reliability. Combining responses to Questions 8 and 9 indicated $\alpha=.807$. The closer alpha is to 1.0 the greater the internal consistency (Gliem & Gliem, 2003) and a Cronbach alpha greater than .7 is considered acceptable.

The self-efficacy literature indicated that student perceptions of abilities were often based on experiences or performance, therefore, analysis of the relationship

between perceptions of college or career readiness and performance measured by WorkKeys assessments or GPA was conducted using the Pearson's Chi-square test for independence. This nonparametric statistical test is appropriate to use when the sample is not randomly selected, as was the case in this study, and the data are not interval or ratio scores (Corder & Foreman, 2009); WorkKeys level scores are ranked scores. Also, Likert items on a survey, when analyzed individually, are considered ordinal data for which non-parametric tests are more appropriate (Corder & Foreman, 2009; Suter, 1998). The Chi-square test uses frequency data and contingency tables to analyze relationships between categories. In this study, data were separated into categories primarily by WorkKeys scores and grade point average in order to determine statistical significance of the relationship to college and career ready perceptions. Results of the data analyses are presented in the following chapter.

Strategies to Ensure Soundness of Data and Findings

Every effort was made to maintain procedures that minimized threats to validity and reliability of the data but as with any study, unforeseen variables, or confounding factors, were present in this study. One confounding factor that threatened validity was testing, meaning that some participants became familiar with the measures used in the study (Creswell, 2008). Alaska students had access to Career Ready 101 online curriculum that provided sample questions and practice WorkKeys assessments, and it was unknown how many students would have the opportunity to practice by using the curriculum or practice tests. This factor was addressed by adding

an item to the survey asking students if they completed practice questions or tests prior to taking the assessments and then using that data in some of the analysis.

Another potential confounding factor or threat relevant to this study was instrumentation, or changes in those administering the survey and affecting how students completed the survey (Russ-Eft & Preskill, 2001). Because students were separated into groups that fit into a computer lab, there were different people reviewing instructions and answering students' questions. A script with instructions was provided to minimize this threat to validity.

A final confounding factor was that some juniors had not taken the WorkKeys assessment, even though it was mandated. These students may have moved into the district after the assessments were taken and if they came from out of state, they had no experience with WorkKeys. On the day the survey was administered, all of the students were sent to computer labs in groups and those students who did not take the WorkKeys assessments were informed not to complete the survey.

Limitations of the Study

Although survey design was appropriate for gathering students' perceptions, several factors may have limited the results of this study. First, survey research was effective in gathering responses from a large number of participants but limited the responses to only those on the survey instrument, with no opportunity to probe for further details. Further study is needed to delve more deeply into high school student perceptions of college and career readiness related to WorkKeys. A second limitation was the challenge of crafting questions specifically for this study that would result in a

valid and reliable survey instrument. Experts and a pilot study were used to address the validity and reliability of the survey instrument and statistical analysis of portions of the instrument suggested moderate reliability. Additional research using this survey instrument would be needed to evaluate its validity and reliability.

Another limitation of this study that impacted external validity was the limited sample. Sample selection, specifically with random assignment, would have minimized the threat to external validity and the state mandate that all high school juniors take the WorkKeys assessments could have provided a large random sample. However, access to high school students was limited to the Anchorage School District and one high school that chose to participate in the study. Anchorage is a large, urban school district and results of the study would be difficult to generalize to a small, rural school district. Future replication of the study in another school district with similar results would enhance the external validity of this study.

A related limitation of the sample was student participation as a result of the abbreviated class schedule the day of survey administration. School administrators determined the best day to administer the survey was a half-day of classes followed by parent-teacher conferences. A school administrator indicated that on parent-teacher conference days approximately 20% of students are absent from school. Attendance was low on the survey administration day, yet the data suggest the sample was ethnically representative of the high school population. However, the students who did not attend school may have had differing perspectives about school and testing than those in attendance, therefore, the results should not be generalized.

One final limitation of the study was that students may have responded to the questions asking if the results were better, worse, or as expected without a clear understanding of what the score levels meant. Every student who took the assessments was provided a score profile with the results and provided additional information orally the day of the survey administration. However, an adult who supervised a computer lab while students were taking the survey related that one student asked how he knew if his score was better or worse than expected. The adult explained that a Level 5 score was the standard for receiving a gold Career Readiness Certificate signifying an excellent score, and based on that explanation the student determined how to respond. Other students who did not understand the score levels and did not ask what they meant may have responded differently, resulting in varying interpretations of what was a better or worse than expected score.

Chapter 4: Results

In an educational environment where student achievement is measured by standardized tests, ACT WorkKeys assessments have emerged as tools that can assess skills related to both education and work. It was the potential dual purpose of these assessments that led the Alaska Department of Education and Early Development to partner with the Alaska Department of Labor and Workforce Development in bringing WorkKeys to Alaska schools and employment centers. Pilot testing of WorkKeys was conducted in schools and with new regulations by the Alaska Board of Education, all Alaska high school juniors were required to take the ACT WorkKeys Reading for Information, Locating Information, and Applied Mathematics assessments in the fall of 2010. Results of the assessments indicated students' level of skill on a scale from 3 to 7, and scores of 3 or higher on all three assessments earned students a Career Readiness Certificate. In addition, the results of WorkKeys assessments can now be used to meet eligibility criteria for the Alaska Performance Scholarship if a student plans to enter a certificate program (Alaska Commission on Postsecondary Education, 2011).

To determine what these assessments and the results meant to high school students, this research study focused on gathering student perceptions related to the WorkKeys assessments, particularly in the areas of college and career readiness. A survey was administered to Bartlett High School juniors in February 2011 at the time students received their WorkKeys results, asking them to share their WorkKeys scores and perceptions of college and career readiness based on their results. Of the 365

juniors tested, 178 responded to the survey, resulting in a 49% response rate. Five students who responded to less than 90% of the survey items or recorded discrepant scores were removed from the data set, leaving 173 students in the sample for analysis. This chapter describes these high school students, their responses as they relate to this study's research questions, and auxiliary data analysis from the survey responses.

Overview of Respondents and Their WorkKeys Results

The high school that participated in this study enrolled over 1,600 students in the 2010-2011 academic year and is one of the most diverse in the Anchorage School District, with 65% of the student population considered ethnically diverse (Anchorage School District, 2010). The sample of 11th grade student respondents reflected the ethnicity of the overall high school population, with the percentage of African American/Black, Alaska Native/American Indian, and White respondents within two percentage points of the high school population for these ethnicities while Asian or Pacific Islander, Hispanic and Multi-ethnic fell outside of that range (Table 1). The sample included slightly more males (53%, n=172) than females (47%) and academically, 92% of respondents reported a current high school GPA of C or better ($GPA \geq 2.0$), with 24% in the A range (3.50 to 4.00), 49% in the B range (2.50 to 3.49), and 19% in the C range (2.00 to 2.49).

Table 1.
Ethnicity of Sample Compared to High School and School District Populations

| Ethnicity | Sample (n=171) % | High school population (N=1,618)* % | School district, K-12 (N=48,960)* % |
|----------------------------------|------------------------|--|--|
| African American/Black | 11 | 12 | 6 |
| Alaska Native/American Indian | 9 | 10 | 9 |
| Asian or Pacific Islander | 21 | 19 | 15 |
| Hispanic | 6 | 9 | 10 |
| White | 35 | 35 | 47 |
| Multi-ethnic (2 or more races) | 19 | 15 | 13 |

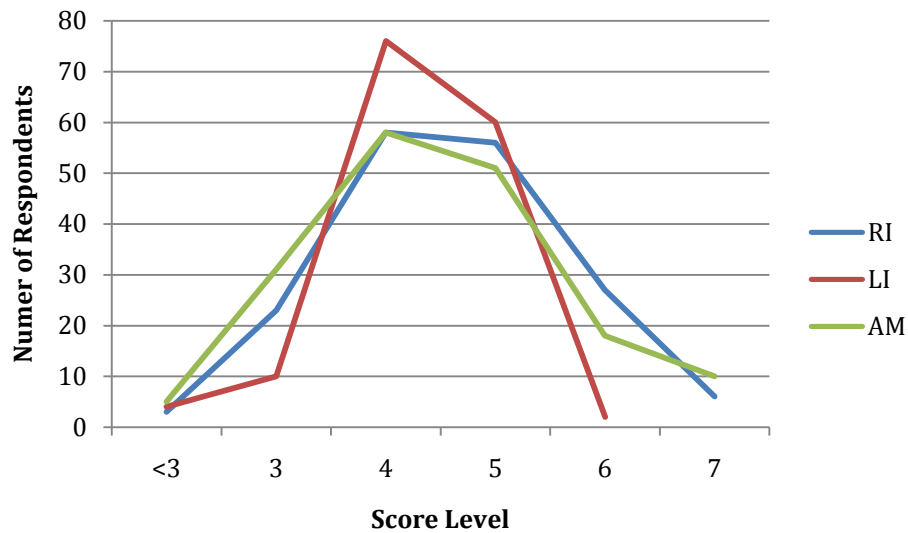
*Anchorage School District Ethnicity Report, October 29, 2010. Retrieved from <http://www.asdk12.org/depts/demographics/ethnicity/index.asp>

Student perceptions of the WorkKeys assessments revealed that these tests were different than other tests they had taken—69% (n=173) agreed or strongly agreed with this statement—and the tests were not a waste of time—74% (n=167) disagreed or strongly disagreed with the statement “The WorkKeys tests were a waste of time.” Nearly three-fourths of students (73%, n=172) also agreed or strongly agreed that they did their best to answer the test questions.

The analysis of survey responses related to perceptions of college and career readiness was based on students’ self-reported WorkKeys scores on each of the three assessments. The distribution of WorkKeys scores was similar for each assessment, and when graphically displayed was symmetrical, approximating a normal curve (Figure 1). This indicated that statistical analyses with assumptions of normal distribution could be applied. However, consideration was also given to the type of data WorkKeys scores represent. The scores are ranked scores, not interval scores, and nonparametric tests are appropriate for this type of data (Corder & Foreman,

2009; Suter, 1998). Since WorkKeys scores are the basis of determining comparison groups for statistical analysis, non-parametric statistical tests have been applied and significance was determined at $\alpha=.05$.

Figure 1.
Distribution of WorkKeys Scores Reported by Students



Note: RI = Reading for Information, LI = Locating Information, AM = Applied Mathematics

Reading for Information results. The Reading for Information assessment measures skills in identifying main ideas, understanding words and meanings used in context, applying information, and analyzing information using workplace documents such as contracts, instructions, and policies (ACT, 2007b, p. 17). The assessment includes 30 items and results are reported in level scores from Level 3 to Level 7, which align with WorkKeys job profile skill levels. Two-thirds of student respondents in this study (66%, $n=173$) scored at Level 4 or Level 5 on the Reading for Information WorkKeys assessment (Table 2), with the median score at Level 5. The

percentage of students in the sample who reported scores at or above Level 5 (51%) was similar to the high school population (54%).

Table 2.
Results of Survey Questions 1, 3, and 5: WorkKeys Scores Compared to Bartlett High School Population Scores

| Assessment | | n | Score | | | | | |
|-------------------------|-----------------------|-----|---------|--------|--------------|--------------|--------|--------|
| | | | <3 % | 3 % | 4 % | 5 % | 6 % | 7 % |
| Reading for Information | Sample | 173 | 1.73 | 13.29 | 33.53 | 32.37 | 15.61 | 3.47 |
| | Bartlett High School* | 364 | 4.95 | 4.67 | 35.99 | 37.09 | 14.01 | 3.30 |
| Locating Information | Sample | 172 | 2.33 | 17.44 | 44.19 | 34.88 | 1.16 | |
| | Bartlett High School* | 365 | 6.30 | 17.81 | 52.05 | 23.56 | .27 | |
| Applied Mathematics | Sample | 173 | 2.89 | 17.92 | 33.53 | 29.48 | 10.40 | 5.78 |
| | Bartlett High School* | 364 | 7.69 | 18.96 | 34.07 | 26.10 | 10.16 | 3.02 |

Note: Boldface denotes median score level. *Source: X. Sun, Anchorage School District Assessment and Evaluation Department, personal communication, September 2, 2011.

An ACT research report indicated that a score of Level 5 on Reading for Information and Applied Mathematics was equivalent to college-ready scores on the ACT college test (ACT, Inc., 2006b), therefore additional analysis was focused on scores at Level 5 and above. Of the 173 respondents analyzed, 89 (51%) reported a score of Level 5 or higher on Reading for Information. Results of this subset of students were further analyzed to determine if they scored at the same level or higher on the other two WorkKeys assessments. Forty-six of these students (52%, n=89)

reported scores of Level 5 or higher on both Locating Information and Applied Mathematics. Another 18 students (20%, n=89) reported scores of Level 5 on Applied Mathematics and Level 4 on Locating Information. Combining these 18 students with those who scored at Level 5 or higher on all three assessments indicated 72% (n=89) of the students who scored at Level 5 on Reading for Information also reported Applied Mathematics results at the college and career ready level. However, when the entire sample was used as the denominator, only 37% (n=173) scored at the college and career ready level indicated by ACT researchers for both Reading for Information and Applied Mathematics.

When students were asked about their perception of the WorkKeys results, over two-thirds indicated Reading for Information results were as expected or better than expected (Table 3). These perceptions were cross-tabulated with scores and results indicated the students who scored the lowest—less than Level 3—perceived their results to be worse than expected (2%) and the students who scored the highest—Level 7—perceived their results to be expected (3%) or better than expected (.6%). Grouping the responses by those who tested at a college readiness level (Level 5 or higher) and those who did not indicated a higher percentage of students who scored below the college-ready level considered their results worse than expected compared to those who scored above the college-ready level (Table 4).

Table 3.
Results of Survey Questions 2, 4, and 6: Perceptions of WorkKeys Results

| Assessment | N | Worse than expected % | Expected % | Better than expected % |
|-------------------------|-----|-----------------------|------------|------------------------|
| Reading for Information | 172 | 29.07 | 47.09 | 23.84 |
| Locating Information | 172 | 33.14 | 45.93 | 20.93 |
| Applied Mathematics | 173 | 21.96 | 53.18 | 24.86 |

Table 4.
Cross-tabulation of WorkKeys Scores and Perceptions of Results

| Assessment | Score level | n | Worse than expected % | Expected % | Better than expected % |
|-------------------------|-------------|-----|-----------------------|------------|------------------------|
| Reading for Information | <5 | 83 | 34.94 | 44.58 | 20.48 |
| | ≥5 | 89 | 23.60 | 49.44 | 26.97 |
| Locating Information | <5 | 110 | 34.55 | 50.00 | 15.45 |
| | ≥5 | 62 | 30.65 | 38.71 | 30.65 |
| Applied Mathematics | <5 | 94 | 27.66 | 52.13 | 20.21 |
| | ≥5 | 79 | 15.19 | 54.43 | 30.38 |

The Chi-square test for independence was applied to determine if there was a statistically significant relationship between perception of results and score level. The results were not significant, $\chi^2 (2, n=172)=2.87, p=.24$, indicating the perception of results was independent of the Reading for Information score level.

Locating Information results. The Locating Information assessment measures skills in finding or summarizing information from graphics, making decisions using information presented, and drawing conclusions from information

presented in the form of graphs, charts, tables, and diagrams (ACT, Inc., 2007b, p. 12). The assessment consists of 32 questions and results are reported in level scores ranging from Level 3 to Level 6, which is one less score level than the other two assessments resulting in a narrower range for distribution of scores. Results of respondents indicated slightly less than two-thirds (64%) scored at Level 4 or below and the median score was Level 4 (Table 2). Just over one-third of students (35%) scored at Level 5, which is considered the college-ready level on the other two assessments. However, students in the sample reported higher scores (36% at Level 5 or higher) than the population (24% at Level 5 or higher).

ACT research on college and career readiness did not include the Locating Information assessment, however, analysis of Level 5 scores and above on Locating Information was conducted to identify similarities across assessments. Of the students who scored at Level 5 or higher on Locating Information, 74% (n=62) also scored at Level 5 or higher on Reading for Information and Applied Mathematics.

Perceptions of respondents regarding results on the Locating Information assessments indicated the largest percentage (46%) believed their results to be what they expected (Table 3). When perceptions were cross-tabulated with scores, 84% of respondents who scored below Level 5 indicated results were as expected or worse than expected, compared to 69% for students who scored at or above Level 5 (Table 4). The Chi-square test for independence was also applied to this set of data. The results were not significant, $\chi^2(2, n=172)=5.65, p=.06$, indicating the perception of results was independent of the Locating Information score level.

Applied Mathematics results. The third WorkKeys assessment, Applied Mathematics, uses story problems to measure test takers' basic mathematic skills such as addition, subtraction, multiplication and division, and ability to solve problems involving fractions, percentages, ratios, measurement, area, and volume (ACT, Inc., 2007b, p. 8). This assessment includes 30 items and results are reported as level scores ranging from Level 3 to Level 7, a range similar to the Reading for Information assessment. Nearly two-thirds of the respondents (63%, n=173) scored at either Level 4 or Level 5 (Table 2), with the median score Level 4. As with the Locating Information results, the students in the sample reported higher scores (46% at Level 5 or higher) than the population (39% at Level 5 or higher).

Students who scored at Level 5 or higher on Applied Mathematics achieved a level that ACT research considered equivalent to a college-readiness score on the ACT college test (ACT, 2006b). In the present study, 46% of respondents (n=173) indicated scores at Level 5 or higher on Applied Mathematics. Of these respondents (n=79), 81% scored at Level 5 or higher on both Applied Mathematics and Reading for Information, and 58% scored at Level 5 or higher on all 3 assessments.

Student perceptions regarding performance on the Applied Mathematics assessment were highest of the three assessments, with 53% (n=173) indicating results were what they expected and 25% indicating results were better than expected (Table 3). When perceptions were crosstabulated with WorkKeys scores, results indicated higher perceptions of performance among students with scores at or above Level 5 than among students with scores below Level 5 (Table 4). When the Chi-square test

for independence was applied the results were not significant, $\chi^2 (2, n=173)=4.87$, $p=.09$, indicating the perception of results was independent of the Applied Mathematics score level.

Perceptions of College Readiness Related to WorkKeys Assessments

The review of literature on self-efficacy identified mastery experiences as one means by which a student could develop belief in his or her abilities to perform or accomplish a task. If the WorkKeys testing experience was considered a type of mastery experience, then the results might contribute to a high school student's self-efficacy about his or her preparation for college. This hypothesis was explored in Question 8 of the survey instrument, which also answered the first research question in this study: What are the perceptions of high school students about college readiness related to the WorkKeys assessments? No definition of college readiness was provided on the survey so students responded based on their individual understanding of college readiness.

Responses to the statements in Question 8 about college readiness indicated that the respondents perceived a connection between WorkKeys and education after high school (Table 5). While three of the statements indicated well over a majority agreement or disagreement, one statement generated almost equal agreement and disagreement: "My WorkKeys results caused me to rethink my education options after high school."

Table 5.
Results of Survey Question 8: College Readiness

| Question | Number of respondents (n) | Strongly disagree % | Disagree % | Agree % | Strongly agree % |
|--|---------------------------|---------------------|------------|---------|------------------|
| 8a. My WorkKeys results caused me to rethink my education options after high school. | 173 | 10.98 | 38.15 | 33.53 | 17.34 |
| 8b. I believe the WorkKeys results are useful in planning for education after high school. | 173 | 3.47 | 13.87 | 58.38 | 24.28 |
| 8c. After seeing my WorkKeys results, I feel confident that I have the skills to be successful in college. | 173 | 6.94 | 26.59 | 50.29 | 16.18 |
| 8d. There is no connection between my WorkKeys results and my education after high school. | 171 | 16.37 | 53.22 | 22.22 | 8.19 |

The literature on self-efficacy suggested that students with high academic efficacy approached academic situations differently than students with low academic efficacy. Therefore, cross-tabulations were constructed to compare perceptions by scores, separated at or above and below Level 5. Cross-tabulations of Question 8a and WorkKeys scores indicated results of students who scored below Level 5 were inverse to the results of students who scored at or above Level 5 (Table 6). In other words, across all three assessments the majority of students who scored below Level 5 agreed that WorkKeys caused them to rethink their education options whereas the majority of

students who scored at or above Level 5 disagreed with the statement. When the Chi-square test of independence was applied to determine significance of any relationship between scores and responses to Question 8a, results related to Reading for Information were not significant, but results related to Applied Mathematics were significant, and indicated a relationship between WorkKeys scores on Applied Mathematics and perceptions related to education options after high school. Statistical analysis using the Chi-square test of independence were also significant for Locating Information scores and the belief that WorkKeys results caused students to rethink their education options after high school.

Table 6.

Cross-tabulation of WorkKeys Scores and Survey Question 8a: My WorkKeys results caused me to rethink my education options after high school

| Assessment | n | Score range | Disagree/Strongly disagree % | Agree/Strongly agree % | χ^2 (df=1) |
|-------------------------|-----|-------------|------------------------------|------------------------|-----------------|
| Reading for Information | 84 | <5 | 42.86 | 57.14 | 2.57 |
| | 89 | \geq 5 | 55.06 | 44.94 | p=.109 |
| Locating Information | 110 | <5 | 40.00 | 60.00 | 10.83 |
| | 62 | \geq 5 | 66.13 | 33.87 | p=.001 |
| Applied Mathematics | 94 | <5 | 40.43 | 59.57 | 6.25 |
| | 79 | \geq 5 | 59.49 | 40.51 | p=.01 |

Similar cross-tabulations were constructed with WorkKeys scores and Question 8b, “I believe the WorkKeys results are useful in planning for education after high school” (Table 7), and over three-fourths of students in both score categories agreed or strongly agreed with this statement. The results were similar for question

8c, “After seeing my WorkKeys results, I feel confident that I have the skills to be successful in college” (Table 8), with nearly two-thirds or more students agreeing or strongly agreeing with the statement. When the Chi-square test of independence was applied, the results were not significant for either Question 8b or 8c with any of the assessments, indicating no relationship between test scores and perceptions that WorkKeys results are useful in planning for education after high school and no relationship between scores and confidence based on WorkKeys results that students had the skills to be successful in college.

Table 7.

Cross-tabulation of WorkKeys Scores and Survey Question 8b: I believe the WorkKeys results are useful in planning for education after high school

| Assessment | n | Score range | Disagree/Strongly disagree % | Agree/Strongly agree % | χ^2 (df=1) |
|-------------------------|-----------|-------------|------------------------------|------------------------|-----------------|
| Reading for Information | 84 91 | <5 ≥5 | 20.24 15.38 | 79.76 84.62 | .71 p=.40 |
| Locating Information | 110 62 | <5 ≥5 | 17.27 17.74 | 82.73 82.26 | .01 p=.94 |
| Applied Mathematics | 94 79 | <5 ≥5 | 14.89 20.25 | 85.11 79.75 | .86 p=.35 |

Table 8.

Cross-tabulation of WorkKeys Scores and Survey Question 8c: After seeing my WorkKeys results, I feel confident that I have the skills to be successful in college.

| Assessment | n | Score range | Disagree/Strongly disagree % | Agree/Strongly agree % | χ^2 (df=1) |
|-------------------------|-----|-------------|------------------------------|------------------------|-----------------|
| Reading for Information | 84 | <5 | 34.52 | 65.48 | .07 |
| | 89 | ≥ 5 | 32.58 | 67.42 | p=.79 |
| Locating Information | 110 | <5 | 36.36 | 63.64 | .95 |
| | 62 | ≥ 5 | 29.03 | 70.97 | p=.33 |
| Applied Mathematics | 94 | <5 | 34.04 | 65.96 | .03 |
| | 79 | ≥ 5 | 32.91 | 67.09 | p=.88 |

The statement in Question 8d, “There is no connection between my WorkKeys results and my education after high school,” was stated in the negative as a means to check consistency of responses regarding college readiness. Responses indicated students strongly disagreed with the statement, regardless of score level (Table 9). The Chi-square test of independence was not significant for any of the three assessments, which confirms that WorkKeys results and responses to the statement are independent.

Table 9.

Cross-tabulation of WorkKeys Scores and Survey Question 8d: There is no connection between my WorkKeys results and my education after high school

| Assessment | n | Score range | Disagree/Strongly disagree % | Agree/Strongly agree % | χ^2 (df=1) |
|-------------------------|-----|-------------|------------------------------|------------------------|-----------------|
| Reading for Information | 82 | <5 | 68.29 | 31.71 | .13 |
| | 89 | ≥ 5 | 70.79 | 29.21 | p=.72 |
| Locating Information | 108 | <5 | 69.44 | 30.56 | .0001 |
| | 62 | ≥ 5 | 69.35 | 30.65 | p=.99 |
| Applied Mathematics | 92 | <5 | 66.30 | 33.70 | 1.02 |
| | 79 | ≥ 5 | 73.42 | 26.58 | p=.31 |

The literature on college readiness indicated that academic skills, particularly English and math, were important indicators of college readiness. If one considers that high school student perceptions of academic skills may influence college readiness self-efficacy, then the responses to survey Questions 11 and 12 about confidence in English and math skills before and after taking WorkKeys assessments may provide insights into perceptions of college readiness. Student respondents were asked to rate their level of confidence in English and math skills on a 4-point scale, with 1 being low and 4 being high. In an ideal situation, students would have been surveyed about confidence in their academic skills before taking WorkKeys assessments and again after taking the assessments. However, the school district strives to limit disruptions to learning and allowed one survey session to be scheduled when students received their WorkKeys results. At that point in time, students were asked to indicate their level of confidence in English and math skills both before and

after taking the WorkKeys assessments. The results indicated an increase in confidence of both English and math skills after taking the WorkKeys assessments (Table 10). The before and after perceptions provided matched pairs which were analyzed for significance using the Wilcoxon signed-rank test, a nonparametric statistic used to compare related samples (Corder & Foreman, 2009). The Wilcoxon signed-rank test for English indicated the difference, or shift in perceived confidence, was significant, $Z=2.12$, $p=.034$, and the signed-rank test indicated the shift in perceived confidence for math was also significant, $Z=2.56$, $p=.011$.

Table 10.
Responses to Survey Questions 11 and 12 Regarding Confidence in Academic Skills

| Academic area | | n | Confidence level | | | |
|---------------|-----------------|-----|------------------|--------|--------|----------------|
| | | | Low 1 % | 2 % | 3 % | High 4 % |
| English | Before WorkKeys | 171 | 7.60 | 18.71 | 42.11 | 31.58 |
| | After WorkKeys | 171 | 5.26 | 14.62 | 46.20 | 33.92 |
| Math | Before WorkKeys | 173 | 13.29 | 19.08 | 46.82 | 20.81 |
| | After WorkKeys | 171 | 7.60 | 17.54 | 50.88 | 23.98 |

Comparing the shift in confidence in English and math with perceptions of performance on Reading for Information and Applied Mathematics indicated that those students who were less confident in their English or math skills also believed they did worse than expected on the assessment (Table 11). The percentages suggest a relationship between shift in confidence and perception of performance but Chi-square

analysis was not applied to determine significance because some of the cells in the contingency table had frequencies less than five which is the minimum needed for reliable results.

Table 11.
Cross-tabulation of Perceptions of WorkKeys Results and Shift in English and Math Skills Confidence

| Assessment | Perception of results | Confidence in skills | | |
|-------------------------|-----------------------|-------------------------|----------------------------------|-------------------------|
| | | Decreased % (n = 17) | Remained the same % (n = 119) | Increased % (n = 36) |
| Reading for Information | Worse than expected | 70.59 | 26.89 | 16.67 |
| | As expected | 23.53 | 55.46 | 30.56 |
| | Better than expected | 5.88 | 17.65 | 52.78 |
| | Total | 100.00 | 100.00 | 100.00 |
| Applied Mathematics | Worse than expected | 45.00 | 20.17 | 15.39 |
| | As expected | 40.00 | 60.53 | 38.46 |
| | Better than expected | 15.00 | 19.30 | 46.15 |
| | Total | 100.00 | 100.00 | 100.00 |

The final analysis regarding college readiness involved students' reported grade point average (GPA). The review of literature suggested that GPA was an indicator of academic ability, therefore influencing academic self-efficacy and perceptions of college readiness. Students' responses to survey items in Question 8 were crosstabulated with their self-reported GPAs to explore relationships between college readiness perceptions based on WorkKeys and GPA. GPA was divided into

three categories to maintain cell frequencies larger than five for statistical analysis, resulting in nearly half of the students falling into the 2.50 to 3.49 GPA range (49%, Table 12). Cross-tabulations indicated that the highest percentage of students who agreed with the statement, “My WorkKeys results caused me to rethink my education options after high school,” were students with a GPA of 2.5 or lower (58%) and these were the students who had the lowest percentage of agreement with the statement, “After seeing my WorkKeys results, I feel confident that I have the skills to be successful in college” (58%). The percentage of students who agreed that WorkKeys results were useful in planning for education after high school was nearly equal across all GPA ranges and over 60% students in all grade ranges disagreed with the statement, “There is no connection between my WorkKeys results and my education after high school,” with the highest percentage of disagreement at the 3.50 to 4.00 GPA range. Chi-square analysis of independence indicated no significant relationships between any of the statements in Question 8 and GPA.

Table 12.
Cross-tabulation of Survey Question 8 and GPA

| Survey question item | GPA | n | Disagree/Strongly disagree % | Agree/Strongly agree % | χ^2 (df=2) |
|--|-----------|----|------------------------------|------------------------|-----------------|
| 8a: My WorkKeys results caused me to rethink my education options after high school. | 3.50-4.00 | 41 | 58.54 | 41.46 | 2.38 p=.30 |
| | 2.50-3.49 | 84 | 47.62 | 52.38 | |
| | <2.50 | 45 | 42.22 | 57.78 | |
| 8b: I believe the WorkKeys results are useful in planning for education after high school. | 3.50-4.00 | 41 | 17.07 | 82.93 | .13 p=.94 |
| | 2.50-3.49 | 84 | 15.48 | 84.52 | |
| | <2.50 | 45 | 17.78 | 82.22 | |
| 8c: After seeing my WorkKeys results, I feel confident that I have the skills to be successful in college. | 3.50-4.00 | 41 | 36.59 | 63.41 | 3.73 p=.15 |
| | 2.50-3.49 | 84 | 26.19 | 73.81 | |
| | <2.50 | 45 | 42.22 | 57.78 | |
| 8d: There is no connection between my WorkKeys results and my education after high school. | 3.50-4.00 | 41 | 78.05 | 21.95 | 3.17 p=.20 |
| | 2.50-3.49 | 82 | 63.41 | 36.59 | |
| | <2.50 | 45 | 73.33 | 26.67 | |

Perceptions of Career Readiness Related to WorkKeys Assessments

Review of the literature on career readiness indicated that the academic skills necessary to be successful in college are some of the same skills employers seek in entry-level employees. Therefore, high school students who took the WorkKeys

assessments were asked questions about their perceptions regarding career readiness related to the WorkKeys assessments that were parallel to the questions asked about college readiness. As with the hypothesis and research question about perceptions of college readiness based on WorkKeys, the perception of career readiness also relies on the theory of self-efficacy and WorkKeys testing as a mastery experience that influences a student's belief about abilities necessary to be successful in a career. To explore this hypothesis, the second research question asked: What are the perceptions of high school students about career readiness related to the WorkKeys assessments? No definition of career readiness was provided in the survey instrument so student responses were based on their individual understandings of career readiness.

Student responses to the statements in Question 9 provided data to analyze research Question 2 (Table 13). Like the responses to college readiness statements, a majority of students agreed with the career readiness statements, suggesting a perceived connection between WorkKeys and career readiness. The highest level of agreement was on Question 9a, "After seeing my WorkKeys results, I feel confident that I have the skills to be successful in a career," with 74% of students agreeing or strongly agreeing with this statement.

Table 13.
Results from Survey Question 9: Career Readiness

| Question | Number of respondents (n) | Strongly disagree % | Disagree % | Agree % | Strongly agree % |
|---|---------------------------|---------------------|------------|---------|------------------|
| 9a. After seeing my WorkKeys results, I feel confident that I have the skills to be successful in a career. | 172 | 6.40 | 19.77 | 54.65 | 19.19 |
| 9b. My WorkKeys results caused me to consider career options I had not thought about before. | 173 | 9.83 | 37.57 | 41.62 | 10.98 |
| 9c. I believe the WorkKeys results are useful in planning for my future career. | 172 | 6.40 | 20.93 | 52.91 | 19.77 |
| 9d. There is no connection between my WorkKeys results and my career plans. | 171 | 17.54 | 45.61 | 28.66 | 8.19 |

Cross-tabulation also indicated high level of agreement across score categories on all three assessments (Table 14). When the Chi-square test of independence was applied, the results were significant only for Applied Mathematics, indicating a relationship between Applied Mathematics scores and perceptions of confidence in skills needed to be successful in a career.

Table 14.
Cross-tabulation of WorkKeys Scores and Survey Question 9a: After seeing my WorkKeys results, I feel confident that I have the skills to be successful in a career

| Assessment | n | Score range | Disagree/Strongly disagree % | Agree/Strongly agree % | χ^2 (df=1) |
|-------------------------|-----|-------------|------------------------------|------------------------|-----------------|
| Reading for Information | 83 | <5 | 28.92 | 71.08 | .63 |
| | 89 | ≥ 5 | 23.60 | 76.40 | p=.43 |
| Locating Information | 109 | <5 | 30.28 | 69.72 | 2.43 |
| | 62 | ≥ 5 | 19.35 | 80.65 | p=.12 |
| Applied Mathematics | 93 | <5 | 35.48 | 64.52 | 9.11 |
| | 79 | ≥ 5 | 15.19 | 84.81 | p=.002 |

The responses to the statement in Question 9b, “My WorkKeys results caused me to consider career options I had not thought about before,” indicated the narrowest difference in responses about career readiness, with 52% indicating agreement and 48% disagreement (Table 13). When cross-tabulated with WorkKeys scores, the results indicated differences between students who scored below Level 5 and those who scored at or above Level 5 (Table 15). Over half of students who scored at or above Level 5 on Reading for Information and Locating Information disagreed with the statement, whereas just over 50% of students at both score levels on Applied Mathematics agreed or strongly agreed that WorkKeys results caused them to consider career options not considered before. When the Chi-square test of independence was applied, the results were not significant for any of the WorkKeys assessments.

Table 15.
Cross-tabulation of WorkKeys Scores and Survey Question 9b: My WorkKeys results caused me to consider career options I had not thought about before

| Assessment | n | Score range | Disagree/Strongly disagree % | Agree/Strongly agree % | χ^2 (df=1) |
|-------------------------|-----|-------------|------------------------------|------------------------|-----------------|
| Reading for Information | 84 | <5 | 42.86 | 57.14 | 1.35 p=.25 |
| | 89 | ≥ 5 | 51.69 | 48.31 | |
| Locating Information | 110 | <5 | 43.64 | 56.36 | 1.99 p=.16 |
| | 62 | ≥ 5 | 54.84 | 45.16 | |
| Applied Mathematics | 94 | <5 | 45.74 | 54.26 | .23 p=.63 |
| | 79 | ≥ 5 | 49.37 | 50.63 | |

Responses to the statement in Question 9c, “I believe the WorkKeys results are useful in planning for my future career,” showed levels of agreement (73%) nearly as high as those in question 9a regarding confidence in skills to be successful in a career (74%, Table 13). Cross-tabulation indicated that the high level of agreement was across score levels (Table 16) and the Chi-square test of independence results were not significant, indicating the perceptions of WorkKeys results as useful in planning for a future career were independent of the scores.

Table 16.

Cross-tabulation of WorkKeys Scores and Survey Question 9c: I believe the WorkKeys results are useful in planning for my future career

| Assessment | n | Score range | Disagree/Strongly disagree % | Agree/Strongly agree % | χ^2 (df=1) |
|-------------------------|-----|-------------|------------------------------|------------------------|-----------------|
| Reading for Information | 83 | <5 | 28.92 | 71.08 | .20 |
| | 89 | \geq 5 | 25.84 | 74.16 | p=.65 |
| Locating Information | 110 | <5 | 26.36 | 73.64 | .20 |
| | 61 | \geq 5 | 29.51 | 70.49 | p=.66 |
| Applied Mathematics | 94 | <5 | 29.79 | 70.21 | .63 |
| | 78 | \geq 5 | 24.36 | 75.64 | p=.43 |

The statement in Question 9d, “There is no connection between my WorkKeys results and my career plans,” was stated negatively as a means to check consistency of responses about career readiness. Results indicated over 50% of respondents disagreed with the statement for all three assessments, regardless of their score level (Table 17). Application of the Chi-square test of independence provided results that were not significant, indicating level of agreement with this statement was not related to WorkKeys scores.

Table 17.
Cross-tabulation of WorkKeys Scores and Survey Question 9d: There is no connection between my WorkKeys results and my career plans

| Assessment | n | Score range | Disagree/Strongly disagree % | Agree/Strongly agree % | χ^2 (df=1) |
|-------------------------|-----|-------------|------------------------------|------------------------|-----------------|
| Reading for Information | 82 | <5 | 58.54 | 41.46 | 1.45 p=.23 |
| | 89 | ≥ 5 | 67.42 | 32.58 | |
| Locating Information | 108 | <5 | 62.96 | 37.04 | <.001 p=.99 |
| | 62 | ≥ 5 | 62.90 | 37.10 | |
| Applied Mathematics | 92 | <5 | 58.70 | 41.30 | 1.70 p=.19 |
| | 79 | ≥ 5 | 68.35 | 31.65 | |

If the skill sets needed for college and career readiness are the same, as the research literature suggests, then another hypothesis could be made that perceptions of college and career readiness are the same. Using the parallel statements from Question 8 and Question 9, cross-tabulations were developed and the results indicated that if a student agreed with a statement related to college readiness, at least 75% also agreed to the parallel statement about career readiness (Table 18). When the Chi-square test of independence was applied, the results indicated a significant relationship between responses to Question 8 regarding perceptions of college readiness related to WorkKeys and Question 9 regarding perceptions of career readiness related to WorkKeys.

Table 18.
Cross-tabulation of Survey Questions 8 and 9

| Paired questions | College readiness | n | Career readiness | | χ^2 (df=1) |
|---|-------------------|-----|------------------|-------|--------------------|
| | | | Disagree | Agree | |
| Q8a and Q9b: My WorkKeys results caused me to rethink education/career options. | Disagree | 85 | 72.94 | 27.06 | 43.73 p<.001 |
| | Agree | 88 | 22.73 | 77.27 | |
| Q8b and Q9c: I believe my WorkKeys results are useful in planning for future education/career. | Disagree | 30 | 83.33 | 16.67 | 57.40 p<.001 |
| | Agree | 142 | 15.49 | 84.51 | |
| Q8c and Q9a: After seeing my WorkKeys results, I feel confident I have the skills to be successful in college/career. | Disagree | 58 | 56.90 | 43.10 | 42.79 p<.001 |
| | Agree | 114 | 10.53 | 89.47 | |
| Q8d and Q9d: There is no connection between WorkKeys results and future education/career. | Disagree | 119 | 80.67 | 19.33 | 51.59 p<.001 |
| | Agree | 52 | 23.08 | 76.92 | |

Additional Findings

One of the confounding factors that threatened validity in this study was testing. High school students had the opportunity to take practice WorkKeys tests before the official administration using online curriculum provided through the school district. In order to determine if prior testing had any influence on the study results, students were asked if they had completed practice questions prior to taking the official assessments. Thirty-seven percent (n=172) of the students indicated they completed practice questions or tests. To determine if testing practice influenced scores or perceptions of results, contingency tables were constructed. Cross-

tabulations of test scores with responses to the question of whether students had experience with WorkKeys indicated that students who took the practice tests scored lower on all three assessments than students who completed no practice questions or tests (Table 19). Analysis using the Chi-square test of independence resulted in a significant relationship between completion of practice tests and scores for Reading for Information, Locating Information, and Applied Mathematics.

Table 19.
Cross-tabulation of WorkKeys Scores and Completion of Practice Questions or Tests

| Assessment | Respondent group | n | Score level | | χ^2 (df=1) |
|-------------------------|------------------|-----|-------------|---------------|--------------------|
| | | | <5 % | \geq 5 % | |
| Reading for Information | Practice | 63 | 65.08 | 34.92 | 11.27 p=.001 |
| | No practice | 109 | 38.53 | 61.47 | |
| Locating Information | Practice | 62 | 79.03 | 20.97 | 9.84 p=.002 |
| | No practice | 109 | 55.05 | 44.95 | |
| Applied Mathematics | Practice | 63 | 66.67 | 33.33 | 5.79 p=.016 |
| | No practice | 109 | 47.71 | 52.29 | |

However, when cross-tabulation of practice test responses and perceptions of scores on the WorkKeys assessments were calculated (Table 20), two-thirds of those who had completed practice tests or questions indicated perceptions of scores better than expected on Locating Information. The results for Reading for Information and Applied Mathematics indicated a slightly higher percentage of expected or better than expected responses from those who had practiced. When the Chi-square test for independence was applied, the results were significant only for the Locating Information assessment.

Table 20.
Cross-tabulation of Perceptions of WorkKeys Results and Completion of Practice Questions or Tests

| Assessment | Respondent group | n | Perception of results | | | χ^2 (df=2) |
|-------------------------|------------------|-----|-----------------------|---------------|------------------------|--------------------|
| | | | Worse than expected % | As expected % | Better than expected % | |
| Reading for Information | Practice | 63 | 26.98 | 49.21 | 23.81 | .24 p=.88 |
| | No practice | 109 | 30.28 | 45.87 | 23.85 | |
| Locating Information | Practice | 62 | 19.35 | 14.52 | 66.13 | 15.66 p<.001 |
| | No practice | 109 | 40.37 | 24.77 | 34.86 | |
| Applied Mathematics | Practice | 63 | 22.22 | 55.56 | 22.22 | .44 p=.80 |
| | No practice | 109 | 22.02 | 51.38 | 26.61 | |

Chapter 5: Discussion and Conclusions

In the 21st century global economy, employers are calling for entry-level employees with basic academic skills (The Conference Board et al., 2006). At the same time, educators are being held accountable for student achievement in academic skill areas similar to those required by employers. In this environment, WorkKeys appears to be an assessment that could respond to needs of both employers and educators, and serve as an indicator to test takers describing their readiness for further education or a career. Other assessments like the ACT college test have been administered to students for over 50 years (ACT, Inc., 2009, Autumn) but measure only academic achievement as it relates to college. WorkKeys assessments, on the other hand, focus on foundation skills employers seek including reading and math, which are also necessary for college. It is the connection of workforce skills to education that makes these assessments unique. Yet WorkKeys assessments have only been administered nationally since 1992 (ACT, Inc., 2009, Autumn) so more research is needed to validate their use for both education and the workplace.

Previous research on WorkKeys assessments focused on results related to race, gender, and educational level (Barnes, 2002); age and work hours (Belton, 2000); college placement tests (Bowles, 2004); and college aptitude tests (ACT, Inc., 2006b). This research study approached the use of WorkKeys differently and explored the perceptions of students in one Alaska high school regarding college and career readiness related to WorkKeys assessments. These students were among the first high school juniors in the state to take three WorkKeys assessments—Reading for

Information, Locating Information, and Applied Mathematics—as required by the Alaska Department of Education and Early Development (Work Ready/College Ready, 2010). Alaska policymakers believed these assessments could be useful to educators and high school students as well as employers in measuring foundational skills needed for students’ future education, training, and employment (Alaska Career Ready, 2011). This chapter presents a discussion of the findings regarding high school student perceptions of college and career readiness related to the WorkKeys assessments and perceptions of WorkKeys assessments in general. Implications for practice when using WorkKeys with high school students are also discussed, followed by recommendations for future study.

Summary of Findings

This study was guided by two research questions: (a) What are the perceptions of high school students about college readiness related to the WorkKeys assessments? and (b) What are the perceptions of high school students about career readiness related to the WorkKeys assessments? When responses to the survey questions related to college readiness and career readiness were analyzed in a contingency table, the results indicated a significant relationship between students’ responses in these two areas. Given this relationship in responses regarding college and career readiness, the results were analyzed for key findings that encompassed both college and career readiness. This section provides those key findings.

Readiness perceptions and readiness scores. High school juniors’ confidence in their college and career readiness as shown by WorkKeys results was

strong—66% agreed they had the skills to be successful in college and 74% agreed they had the skills to be successful in a career. Yet their self-reported WorkKeys scores indicated that only 37% actually tested at the college-ready level determined by ACT. This discrepancy between perceptions and skill levels was also reflected in the responses to statements about whether the scores were what students expected. From 22% on Applied Mathematics to 29% on Reading for Information and 33% on Locating Information, students responded that the results were worse than expected, suggesting they believed they were more capable. Again, perceptions of abilities were greater than the results indicated. This discrepancy between perceptions and actual skill levels is consistent with the increasing number of students who enroll in college believing they are ready for college-level work but must first take developmental courses because their skills are not at the level needed for college. Approximately one-third of first-year college students in the United States enroll in at least one remedial course (Greene & Winters, 2005; National Center for Education Statistics, 2010) and in community colleges, that percentage has been reported as high as 68% at some institutions (Perin & Charron, 2006); at the University of Alaska Anchorage 38% of first-year students enroll in remedial courses (University of Alaska Anchorage Office of Institutional Effectiveness, Engagement, and Academic Support, 2009). Among college students who thought they were well-prepared for college, nearly one-third took at least one remedial course (Peter D. Hart Research Associates, 2005).

Why are high school students developing this perception of competence that is greater than assessments and other measures of skill indicate? Are they receiving

meaningful feedback on their academic preparedness? Grades on coursework and grade point average (GPA) are provided regularly as signals of academic ability. Nearly three-fourths of the high school students in this study (73%) self-reported GPA in the A or B range. Although the accuracy of a self-reported GPA may be questioned, it does suggest students perceived they were successful in school. Yet results of this study indicated that perceptions did not match the level of skill expected in college or the workplace. One factor to consider is that the students tested were juniors in high school, with one and a half years of schooling left before they go on to college or the workforce. Research suggests that educational level is a significant factor in WorkKeys results for reading and math (Barnes, 2002), with older students scoring higher than high school students, so the difference between scores and perceptions of high school students might be expected. Or perhaps the discrepancy between perceptions of competence and assessment results lies in the interpretation of the results.

Standardized tests such as WorkKeys are external assessments, separated from learning that takes place in the classroom. The assessments are administered in a controlled testing environment and the results are shared with students and their parents with little explanation of what they mean. When students in Minnesota were asked what they thought about standardized tests, their responses suggested that the purpose of standardized tests and meaning of the results were unclear:

Did your teacher ever mention what the purposes of these tests were? I don't think these tests are used to their full potential. If the purpose of most of these is for evaluating basic skill comprehension, then maybe if parents and their kids were more knowledgeable of the scores and how

their child performed, the tests could be more valuable... (Students Speak Out, 2008, para. 4)

In this study, high school student responses indicated only about half of them would rethink college and career options based on their WorkKeys results, suggesting that future plans of the other half of the students remained the same despite the test results, or that the meaning of the results was unclear. In either case, it raises a question about what the results signal to students.

If the WorkKeys results are explained so that students understand they are valid indicators of work readiness skills, which are similar to college readiness skills, then students might better understand the purpose of the assessments as well as their own level of skills. With an increased understanding of skills in relationship to a potential career and the related education, high school students might consider different course options based on their scores. Put in the context of self-efficacy theory, better understanding of the scores may influence self-efficacy, which research has identified as a predictor of academic persistence and perceived career options (Bores-Rangel, Church, Szendre, & Reeves, 1990; Gore & Leuwerke, 2000; Lent et al., 1987). The WorkKeys results or score profiles include descriptions of the skills demonstrated by the test taker, but interventions are needed to help high school students connect the results to steps that will increase their skills.

Even if high school students understand that WorkKeys results signal their academic abilities to employers and educators, do they understand what it means to be academically prepared for college and a career? The discrepancy between their perceptions and their scores suggest they do not. Other factors such as GPA, class

rank, and high school curriculum are better predictors than tests for college success (Adelman, 1999; Alexander et al., 1982; Hay 2005) which suggests that the best way to prepare students for their future is in their high school courses. College readiness efforts in California indicate classroom level interventions are successful in preparing high school students for college. The focus of the California State University Early Assessment Program on the classroom and teachers resulted in new courses, academic supports, and professional development that helped teachers promote college readiness of students (Spence, 2009). Restructuring high school courses to develop skills needed in college and aligning curriculum with college entry-level standards has also resulted in better preparation of students for college (Conley, 2007). If the goal of Alaska educational policy is to prepare students for college and careers, then educators and policymakers should look beyond WorkKeys assessments and determine how coursework can be integrated into a system of college preparation and career development for high school students. The results of the California Early Assessment Program suggest that a system change targeted at high school students also needs to include professional development for teachers since they would be involved in implementation.

WorkKeys and self-efficacy. While confidence in excess of competence may lead students into situations for which they are unprepared, confidence in abilities can also be an asset that helps students be successful in their endeavors. According to self-efficacy theory, individuals bring confidence of their abilities, or self-efficacy, into any situation and interpret the results of a new situation in relationship to their

existing efficacy beliefs (Bandura, 1997; Pajares, 1996). Based on the strength of efficacy beliefs and the interpretation of a given situation, one's self-efficacy may not change, or may be enhanced or diminished. The relationship between competence and confidence varies with each individual. For example, a student who performs well on a math assessment but has low math self-efficacy may attribute the results to luck rather than ability, and self-efficacy is not increased. On the other hand, a student who performs well on the same assessment and has higher self-efficacy may believe it was his or her persistence and hard work that led to the results, which enhances confidence and self-efficacy. In the case of WorkKeys assessments, results of this study indicated high school students were more confident of their math and English skills after taking the assessments. In addition, students who scored lowest on the assessments believed they did worse than expected compared to those who scored higher, and students who scored highest believed they did as expected or better than expected. This suggests that WorkKeys scores might influence beliefs about academic abilities, but statistical analysis did not show any significant relationship between scores and perception of performance, or GPA and perception of performance. Therefore, the level of scores does not seem to be a direct factor contributing to self-efficacy of students.

Yet self-efficacy theory also suggests that those individuals who were confident in their academic abilities before taking WorkKeys, despite their level of skill, could be affirmed by successful performance on assessments. For example, 15% to 20% of students who scored below the college-ready level indicated they performed better than expected on all three assessments and 45% to 50% indicated they

performed as expected, suggesting some confidence in their skill level. ACT also provided an indicator of success on WorkKeys other than scores that may contribute to the perception of successful performance. Students who scored at Level 3 or higher on all three WorkKeys assessments received a National Career Readiness Certificate, which could be seen as a signal of success. This confirmation of ability via a certificate may add to individual beliefs about academic abilities.

However, further examination is needed before drawing that conclusion. First, the group of students who scored below Level 3 and did not receive a certificate provided insights related to self-efficacy. Aggregated results from the high school suggest that a greater number of students with less than college-ready scores were absent from school the day the survey was administered. Perhaps these students did not perform well academically in the past and chose to stay away from school that day. Of the students who had less than college-ready scores and did complete the survey, nearly one-third or more indicated they did worse than expected on all three assessments, were less confident they had the skills to be successful in a career, and were more likely to rethink their education options after high school. Practicing WorkKeys before testing didn't seem to help—nearly two-thirds of those who reported completing practice questions or tests scored below the college-ready level. Receiving the results without interpretation or intervention may serve as confirmation to students with low academic self-efficacy that their skills are deficient.

Another area to be explored before drawing any conclusions about how WorkKeys might influence self-efficacy surrounds the signals students receive from

WorkKeys results. Students receive mixed messages about WorkKeys as a measure of college and career readiness when they are awarded certificates at score levels that are not at the level needed for entry-level college work or employment. ACT reports indicate that scores at Level 3 on WorkKeys Reading for Information, Locating Information, and Applied Mathematics earn a Bronze National Career Readiness Certificate (NCRC) and meet the necessary skills for only 35% of the more than 10,000 jobs in ACT's job profiles database (ACT, Inc., 2007b); Level 4 scores on each assessment earn a Silver NCRC and meet the skills for 65% of the jobs, and Level 5 scores earn a Gold NCRC and meet the skills needed for 90% of the jobs. Over 90% of high school students in the sample scored at the level needed to earn a Bronze NCRC or higher, yet only 37% scored at Level 5 which is required by most employers and is considered the college-ready level. Providing an award at Level 3 suggests one has achieved a level of accomplishment that is valued by the testing agency and employers, but to qualify for an Alaska Performance Scholarship to be used at postsecondary institutions in the state students must score at a Level 5. The review of literature suggests employers seek the same level of skill that is needed for entry into college. Without clear indication of abilities with reference to college or the workplace, WorkKeys results may confuse high school students rather than enhance their beliefs about academic abilities and potential future outcomes. Providing clarity to the results may add value to the assessments for students and connect the experience to future expectations of a college education or employment.

Value of WorkKeys to students. Students recognized the WorkKeys assessments as new and different, and contrary to other research regarding perceptions of high school students toward standardized achievement tests (Paris et al., 2000), students in this study had positive perceptions of the WorkKeys assessments. This response was unexpected from high school students who were required to take the tests; as students get older they are more likely to develop negative attitudes about testing (Paris et al., 2000). Yet nearly three-fourths of high school students in this study believed the results were useful in planning for further education or a career, and believed the assessments were not a waste of time. Perhaps it was the realistic nature of the work-based questions that resulted in students' positive perceptions, connecting their education to the workplace, which was the intent of the assessment developers. A follow-up research study asking students to describe their perceptions could be valuable in planning how to use WorkKeys results.

While high school student perceptions of WorkKeys in this study are notable, a question to consider is whether these positive perceptions will persist over time as the novelty of these assessments diminishes. The policy position regarding the use of WorkKeys could do much to influence these perceptions. Research indicates that assessments oriented toward a performance goal with rewards attached serve to reinforce students' abilities but do not motivate them to seek further learning to build skills (Harlen & Crick, 2003; O'Neil et al., 1997). In fact, poor results perceived as a lack of ability can lead to less effort (Tollefson, 2000). The current WorkKeys policies in Alaska seem to have a performance focus, with the emphasis on scores

needed to earn a Career Readiness Certificate or meet eligibility requirements for the Alaska Performance Scholarship. Efforts related to this new educational policy have focused on administration of the WorkKeys assessments and helping school administrators and proctors understand the structure of the assessments and scoring rather than interpretation of score results with students (M. Olson, personal communication, December 21, 2011). The responsibility for score interpretation rests on the school district.

Given the high school student perceptions of usefulness in planning for college and careers, interpretation of results could be critical in advancing student learning. Approaching WorkKeys testing from a learning-oriented perspective that uses the results to connect students' learning to careers could enhance not only student engagement and performance on the tests but also enhance student learning related to reading and math. Research indicates assessments that are learning-oriented or formative lead students to seek ways to improve and the assessment becomes a means to measure their progress in obtaining the knowledge and skills they seek (O'Neil et al., 1997; Tollefson, 2000). This can motivate students to seek additional learning and help them develop into lifelong learners.

Preparing high school students to transition into further education and entry into the workforce is an important issue for many stakeholders, each with a different perspective. The use of WorkKeys as a measure of college and career readiness is one option that has the potential for benefit beyond a set of scores, but a clearly defined purpose is necessary for the full benefit of the assessments to be realized. Current

policies suggest the purpose of WorkKeys testing is to obtain scores that indicate reading for information, locating information, and applied mathematics skill levels to employers and potentially higher education institutions, with practice tests available to improve scores. This suggests the benefit is in the scores alone, but the results of this study indicate value beyond the scores. To capture the full benefit of these assessments by helping high school students identify their current skill levels, match their skills to future career goals, and develop the skills for continued learning and employment, then educational policies should be reconsidered. High school student perceptions of the usefulness of WorkKeys provide policymakers the unique opportunity to support educational interventions that help students determine the next steps along a pathway toward higher education and a career. High school teachers, counselors, and administrators will have an important role in guiding students to use their WorkKeys results to connect education and careers.

It was the intent of the original assessment developers that WorkKeys connect educational skills to the workplace, and this is the strength of these assessments when used with high school students. Connecting education to a career can make learning more meaningful for students, and self-appraisal or awareness of skills is one of the career development skills needed to prepare for the workplace. In addition, providing occupational information through WorkKeys job profiles and other sources, helping students identify a career pathway, and guiding them in planning next steps are the other career decision-making competencies that could provide a learning focus to WorkKeys testing.

Connecting Workkeys results to careers may help high school students understand why they need to learn math and improve their reading skills, but it does not provide information regarding what they need to learn to improve their academic skills or additional coursework they should take. And the design of WorkKeys suggests that more advanced coursework is not necessarily appropriate. The increasing levels of skill measured by WorkKeys do not measure more advanced concepts, such as advanced math formulas and trigonometry, but more complex applications of basic concepts. In order for students to identify additional learning necessary to develop these skills, WorkKeys should be aligned with high school curriculum to determine where the skills measured by WorkKeys are being taught. Then students will be able to use their WorkKeys results to identify the next steps to improve their skills so they are well-prepared for their future.

Implications for Practice

The results of this study provide information for policymakers and educators as they consider the future use of WorkKeys in education. Positive perceptions of WorkKeys by high school students suggest value in continued use of the assessments and in further engagement with students to ascertain the value of WorkKeys. Continued perceptions of utility may depend on use of the Career Readiness Certificate by employers for hiring and use of WorkKeys results by postsecondary institutions for applications and scholarships. Also, if WorkKeys assessments are to be used as a measure of academic skills for entrance to postsecondary education, other factors such as alignment of state content standards with the assessments (Brown &

Conley, 2007) should be considered in the decision-making process. Standardized assessments represent only a sample of a body of knowledge and skills, and care must be taken to ensure the assessments measure the critical knowledge students are expected to master (Popham, 2003). State policies mandating testing of high school students do not appear to achieve the desired result of improving student preparation for college (Jacob, 2001; Musoba, 2006).

If the use is intended to motivate students to higher achievement levels, then expanding upon the WorkKeys assessments and making them part of a system of college and career preparation is necessary for greater achievement of Alaska high school students. It should be the responsibility of the education system that requires the testing to put support into place that helps students. Student perceptions of value in WorkKeys assessments present a unique opportunity for educators, with training and support, to talk to students about the results, how they connect to careers, and how students can plan for those careers. Interpreting the WorkKeys results so students have accurate information about their skills and how they align with entry-level college courses or occupations is a critical first step in guiding high school students toward college and career readiness. Conley (2010) points out the importance of providing students with college readiness information at key points during high school so they can address any deficiencies before graduation: “Nothing is potentially more powerful than enabling students to take control of their own learning and preparation by providing them with longitudinal information on how close to college and career

ready they are...” (p. 22). Educators have an important role in providing students with this information and interpreting it.

Various indicators of college or career readiness are provided to high school students, and WorkKeys assessments are one additional indicator. College placement tests or college credit courses taken while still in high school can also provide students with an indication of college readiness, while work-based learning opportunities can help students develop skills needed for a future career. Whatever means are used to inform high school students of their college and career readiness, policies must be developed to ensure all students are provided the information necessary to make decisions about further education in high school and beyond.

Finally, it is the unique work-based nature of the WorkKeys assessments that links high school students’ learning to the workplace and may motivate them to develop an educational plan with a career goal in mind. Students can align their WorkKeys results with occupational profiles to determine how closely their skills match the skills needed to enter a given occupation. Based on the alignment and their interests, they can identify a career pathway of choice and plan courses to take that will help them achieve the career goal. The process of self-appraisal of skills and interests, gathering occupational information, selecting goals, planning, and then problem-solving have been identified as important competencies for career decision-making. The literature on assessment and self-efficacy also supports this process, suggesting that by setting proximal achievement goals and developing strategies to improve skills students can enhance academic achievement. Therefore, it is

recommended that intentional interventions be developed that incorporate the career decision-making competencies along with WorkKeys results and job profiles to enhance the college and career readiness of Alaska high school students.

Recommendations for Further Study

This was the first year that WorkKeys assessments were used with high school juniors in Alaska so this exploratory study is only the first of many potential research studies on this topic. Replication of the study in another school district, particularly a rural district, would provide a more comprehensive view of Alaska high school students' perceptions of WorkKeys assessments. Another area for future study would be to analyze the existing data based on student ethnicity, gender, socioeconomic status (SES), and GPA. Standardized testing, college readiness, and self-efficacy research previously cited suggest that these factors can influence students' self-efficacy and academic success. Previous WorkKeys research also suggests ethnicity is a factor in score levels. Further research in Alaska regarding WorkKeys scores and perceptions based on ethnicity, gender, SES, and GPA would serve to identify potential equity issues in using these assessments for educational purposes.

Student responses to some of the survey items suggest other possible areas for research. For example, what caused students to change or not change their thinking about future education or a career in relationship to WorkKeys? What was it about WorkKeys that resulted in perceived value to the students? More research to analyze these perceptions could be useful to educators and policymakers. Also, the relationship of scores to completion of practice tests suggests additional research

would be beneficial to determine accuracy of these results and the impact of practice tests on performance during statewide testing.

The theory of self-efficacy and social cognitive career theory provided the theoretical foundation for this study but further study is needed to determine if WorkKeys assessments are variables that influence self-efficacy. The potential of enhanced self-efficacy from students' experience with WorkKeys assessments and the related actions students take regarding continued education and career options is another area of further study that could be pursued.

Finally, if career development interventions are implemented using the WorkKeys results and job profiles, a longitudinal study would be helpful to identify the impact of these interventions on student actions and success in future educational and career endeavors.

Bibliography

- ACT, Inc. (n.d.). *WorkKeys assessment technical bulletin*. Iowa City, IA: Author.
- ACT, Inc. (2000). *WorkKeys: Helping to build a winning workforce*. Iowa City, IA: ACT Educational Services.
- ACT, Inc. (2006a). *Developing a ready-to-train workforce*. Retrieved from <http://www.act.org/workforce/case/northrop.html>
- ACT, Inc. (2006b). *Ready for college and ready for work: Same or different?* Retrieved from <http://www.act.org/research/policymakers/reports/workready.html>
- ACT, Inc. (2007a). *Boosting health care employees' skills and promotion opportunities*. Retrieved from <http://www.act.org/workforce/case/owensboro.html>
- ACT, Inc. (2007b). *National career readiness certificate: Core assessments for certification*. Iowa City, IA: Author.
- ACT, Inc. (2007c). *WorkKeys: An overview*. Iowa City, IA: Author.
- ACT, Inc. (2009, Autumn). ACT at 50—A mission in progress. *Activity*, 47(3). Retrieved from <http://www.act.org/activity/autumn2009/anniversary.html>
- ACT, Inc. (2009a). *Occupational opportunities: A listing of the most common occupations across the country*. Iowa City, IA: Author.
- ACT, Inc. (2009b). *The condition of college readiness 2009*. Retrieved from http://www.act.org/research/policymakers/cccr09/page_8.html
- ACT, Inc. (2010a). *Career seekers: How do I improve my scores?* Retrieved from <http://www.act.org/certificate/improve.html?id=job>
- ACT, Inc. (2010b). *National career readiness certificate*. Retrieved from <http://www.act.org/certificate/certstates.html>
- ACT, Inc. (2010c). *National career readiness certificate: How it works*. Retrieved from <http://www.act.org/certificate/how.html?id=job>
- ACT, Inc. (2010d). *Using your WorkKeys scores*. Retrieved from <http://www.act.org/workkeys/careerseekers/scores.html>

- ACT, Inc. (2011). *States using ACT for statewide testing*. Retrieved from <http://www.act.org/workkeys/educators/statewide.html>
- Achieve, Inc. (n.d.a). *The American diploma project: Closing the expectations gap*. Retrieved from <http://www.achieve.org/files/AboutADP.pdf>
- Achieve, Inc. (n.d.b). *What is college- and career- ready?* Retrieved from <http://www.achieve.org/files/CollegeandCareerReady.pdf>
- Achieve, Inc. (2005). *Achieve, Inc. announces 13-state coalition to improve high schools*. Retrieved from <http://www.achieve.org/node/698>
- Adelman, C. (1999). *Answers in the tool box: Academic intensity, attendance patterns, and bachelor's degree attainment*. Retrieved from ERIC database (ED431363).
- Alaska Advisory Task Force on Higher Education & Career Readiness. (2011). *Improving Alaska's educational system*. Retrieved from http://hecr.aksenate.org/archives/798/final_hecr_report
- Alaska Career Ready. (2011). *Homepage*. Retrieved from <http://careerready.alaska.gov/>
- Alaska Commission on Postsecondary Education. (2011). *APS Awards for eligible students*. Retrieved from https://akadventure.alaska.gov/Grants_and_Scholarships/APS_Award_Levels.aspx
- Alaska Department of Education and Early Development. (2010, February 4). *Statistics and reports: District enrollment totals for all Alaskan public schools 2009–2010*. Retrieved from <http://www.eed.state.ak.us/stats/>
- Alaska Department of Education and Early Development. (2011). *Statewide testing dates: 2011–2012 testing dates*. Retrieved from <http://www.eed.alaska.gov/tls/assessment/testingdates.html>
- Alexander, K. L., Riordan, C., Fennessey, J., & Pallas, A. M. (1982). Social background, academic resources, and college graduation: Recent evidence from the National Longitudinal Survey. *American Journal of Education*, 90(4), 315-333.
- Ali, S. R., McWhirter, E. H., & Chronister, K. M. (2005). Self-efficacy and vocational outcome expectations for adolescents of lower socioeconomic status: A pilot study. *Journal of Career Assessment*, 13(1), 40–58.

- America 2000: Excellence in Education Act, S. 1141, 102d Cong. (1991).
- Anchorage School District. (2010, October). *Ethnicity report*. Retrieved from http://www.asdk12.org/depts/demographics/ethnicity/Ethnicity10_11.pdf
- Association for Career and Technical Education. (n.d.). *What is "career ready?"* Retrieved from http://www.acteonline.org/uploadedfiles/Publications_and_Online_Media/files/career_Readiness_Paper.pdf
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.
- Bandura, A., Barbaranelli, C., Caprara, G. V., & Pastorelli, C. (2001). Self-efficacy beliefs as shapers of children's aspirations and career trajectories. *Child Development, 72*(1), 187–206.
- Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology, 41*(3), 586–598.
- Barnes, S. L. (2002). Applied mathematics and reading for information scores on the American College Testing (ACT) Work Keys assessment: Comparing groups by race, gender, and educational level. *Dissertation Abstracts International, 63*(06A), 2126.
- Baron, J., & Norman, M. F. (1992). SATs, achievement tests, and high-school class rank as predictors of college performance. *Educational and Psychological Measurement, 52*, 1047–1055.
- Belton, H. D. (2000). American College Testing Work Keys assessments and individual variables of one-year vocational completers and two-year technical completers in a selected community college in Mississippi. *Dissertation Abstracts International, 61*(06A), 2275.
- Betz, N. (2007). Career self-efficacy: Exemplary recent research and emerging directions. *Journal of Career Assessment, 15*(4), 403–422. doi: 10.1177/1069072707305759
- Betz, N. E., & Hackett, G. (1981). The relationship of career-related self-efficacy expectations to perceived career options in college men and women. *Journal of Counseling Psychology, 28*(5), 399–410.

- Betz, N. E., & Hackett, G. (2006). Career self-efficacy theory: Back to the future. *Journal of Career Assessment, 14*(1), 3–11.
- Bores-Rangel, E., Church, A. T., Szendre, D., & Reeves, C. (1990). Self-efficacy in relation to occupational consideration and academic performance in high school equivalency students. *Journal of Counseling Psychology, 37*(4), 407–418.
- Bowles, F. E. (2004). *WorkKeys assessments and their validity as academic success predictors* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 3157119)
- Brown, G. T. L., & Hirschfeld, G. H. F. (2008). Students' conceptions of assessment: Links to outcomes. *Assessment in Education: Principles, Policy & Practice, 15*(1), 3–17.
- Brown, R. S., & Conley, D. T. (2007). Comparing state high school assessments to standards for success in entry-level university courses. *Educational Assessment, 12*(2), 137–160.
- Carty, H. M. (2007). Review of the College Survival and Success Scale. In Geisinger, K., Spies, R., Carlson, J., & Plake, B. (Eds.), *The seventeenth mental measurements yearbook*. Lincoln, NE: University of Nebraska Press.
- Cohen, A. M., & Brawer, F. B. (2008). *The American community college* (5th ed.). San Francisco, CA: Jossey-Bass.
- Cohn, E., Cohn, S., Balch, D. C., & Bradley, J., Jr. (2004). Determinants of undergraduate GPAs: SAT scores, high-school GPA, and high-school rank. *Economics of Education Review, 23*(6), 577–586.
- Conley, D. T. (2007). *Redefining college readiness, Volume 3*. Eugene, OR: Educational Policy Improvement Center.
- Conley, D. T. (2010). *College and career ready: Helping all students succeed beyond high school*. San Francisco, CA: Jossey-Bass.
- Corder, G. W., & Foreman, D. I. (2009). *Nonparametric statistics for non-statisticians: A step-by-step approach*. Hoboken, NJ: John Wiley & Sons.
- Council on Competitiveness. (2008, April). *Thrive. The skills imperative*. Retrieved from <http://www.compete.org/publications/detail/472/thrive/>

- Creswell, J. W. (2004). *Research design: Qualitative and quantitative approaches*. Thousand Oaks, CA: Sage Publications.
- Creswell, J. W. (2008). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (3rd ed.). Upper Saddle River, NJ: Pearson Education.
- Gliem, J. A., & Gliem, R. R. (2003). *Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales*. Paper presented at the Midwest Research to Practice Conference in Adult, Continuing, and Community Education. Retrieved from <https://scholarworks.iupui.edu/handle/1805/344>
- Goals 2000: Educate America Act, 20 U.S.C. § 5801 (1994).
- Gore, P. A., Jr., & Leuwerke, W. C. (2000, Summer). Predicting occupational considerations: A comparison of self-efficacy beliefs, outcome expectations, and person-environment congruence. *Journal of Career Assessment*, 8(3), 237–250.
- Green, S. B., & Yang, Y. (2009). Commentary on coefficient alpha: A cautionary tale. *Psychometrika*, 74(1), 121–135.
- Greene, B. B. (2008). Perceptions of the effects of the WorkKeys system in North Carolina. *Dissertation Abstracts International*, 69(12), 1373.
- Greene, J. P., & Winters, M. A. (2005, February). *Public high school graduation and college-readiness rates: 1991–2002* (Education Working Paper No. 8). Retrieved from: http://www.manhattan-institute.org/html/ewp_08.htm
- Hall, V. L. (2010). *Work readiness of career and technical education high school students* (Doctoral dissertation). Retrieved from WorldCat Libraries database and University of Georgia Athens Electronic Theses and Dissertations.
- Harlen, W., & Crick, R. D. (2003, July). Testing and motivation for learning. *Assessment in Education*, 10(2), 169–207. doi: 10.1080/0969594032000121270
- Hay, M. R. (2005). The transition from high school to college: A single-case study. *Dissertation Abstracts International*, 66(02A).
- Hendrick, R. Z. (2006). *Evaluating WorkKeys profiling as a pre-employment assessment tool to increase employee retention* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (UMI No. 3209447)

- House Bill 206, 26th Alaska Legislature. (2010).
- Hossler, D., Schmit, J., & Vesper, N. (1999). *Going to college: How social, economic, and educational factors influence the decisions students make*. Baltimore, MD: The Johns Hopkins University Press.
- Huysamen, G. K. (2006). Coefficient alpha: Unnecessarily ambiguous; Unduly ubiquitous. *SA Journal of Industrial Psychology*, *32*(4), 34–40.
- Isaac, S., & Michael, W. B. (1995). *Handbook in research and evaluation: A collection of principles, methods, and strategies useful in the planning, design, and evaluation of studies in education and the behavioral sciences* (3rd ed.). San Diego, CA: Educational and Industrial Testing Services.
- Jacob, B. A. (2001, Summer). Getting tough? The impact of high school graduation exams. *Educational Evaluation and Policy Analysis*, *23*(2), 99–121.
- Lacey, T. A., & Wright, B. (2009, November). Occupational employment projections to 2018. *Monthly Labor Review*, *132*(11), 82–123. Retrieved from <http://www.bls.gov/opub/mlr/2009/11/home.htm>
- Lent, R. W., Brown, S. D., & Hackett, G. (2002). Social cognitive career theory. In D. Brown & Associates (Ed.), *Career choice and development* (4th ed., pp. 255–311). San Francisco, CA: Jossey-Bass.
- Lent, R. W., Brown, S. D., & Larkin, K. C. (1984). Relation of self-efficacy expectations to academic achievement and persistence. *Journal of Counseling Psychology*, *31*(3), 356–362.
- Lent, R. W., Brown, S. D., & Larkin, K. C. (1986). Self-efficacy in the prediction of academic performance and perceived career options. *Journal of Counseling Psychology*, *33*(3), 265–269.
- Lent, R. W., Brown, S. D., & Larkin, K. C. (1987). Comparison of three theoretically derived variables in predicting career and academic behavior: Self-efficacy, interest congruence, and consequence thinking. *Journal of Counseling Psychology*, *34*(3), 293–298.
- Leong, F. T. L., & Walsh, W. B. (Eds.). (2008). *Encyclopedia of counseling: Vol. 4. Career counseling*. Thousand Oaks, CA: Sage.

- Lindon, J. (2010). *Utilizing WorkKeys as a measure of community and technical college student success* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 3412661)
- Malpass, J. R., O'Neil, H. F., Jr., & Hocevar, D. (1999). Self-regulation, goal orientation, self-efficacy, worry, and high-stakes math achievement for mathematically gifted high school students. *Roeper Review*, *21*(4), 281–288.
- McLarty, J. R., & Vansickle, T. R. (1997). Assessing employability skills: The Work Keys™ system. In H. F. O'Neill, Jr. (Ed.), *Workforce readiness: Competencies and assessment* (pp. 293–325). Mahwah, NJ: Erlbaum.
- Miller, R. T. (1997, Fall). AAACE and ACT: Partners in development of the WorkKeys system. *Adult Learning*, *9*(1), 23–24.
- Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Journal of Counseling Psychology*, *38*(1), 30–38.
- Musoba, G. D. (2006). Accountability v. adequate funding: Which policies influence adequate preparation for college? In E. P. St. John (Ed.), *Readings on equal education: Vol. 21. Public policy and equal educational opportunity: School reforms, postsecondary encouragement, and state policies on postsecondary education* (pp. 79–132). New York, NY: AMS Press.
- Nardi, P. M. (2003). *Doing survey research: A guide to quantitative methods*. Boston, MA: Pearson Education.
- National Association of Manufacturers & Deloitte Development LLC. (2005). *2005 skills gap report: A survey of the American manufacturing workforce*. Retrieved from http://www.doleta.gov/wired/files/us_mfg_talent_management.pdf
- National Center for Education Statistics. (2010, July). Table 241: Percentage of first-year undergraduate students who took remedial education courses, by selected characteristics: 2003–04 and 2007–08. *Digest of Education Statistics: 2010*. Retrieved from http://nces.ed.gov/programs/digest/d10/tables/dt10_241.asp?referrer=list
- National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for educational reform*. Washington, DC: United States Government Printing Office.

- National Governors Association. (n.d.). *Redesigning the American high school*. Retrieved from <http://www.nga.org/cms/home/about/initiatives-of-nga-chairs/col2-content/main-content-list/2004-05-nga-chair-gov-mark-warne.html>
- National Governors Association. (2004, July 18). *Virginia Gov. Mark Warner assumes NGA chairmanship, Arkansas Gov. Mike Huckabee becomes new vice chair*. Retrieved from http://www.nga.org/cms/home/news-room/news-releases/page_2004/col2-content/main-content-list/title_virginia-gov-mark-warner-assumes-nga-chairmanship-arkansas-gov-mike-huckabee-becomes-new-vice-chair.html
- National Governors Association Center for Best Practices. (2005). *Getting it done: Ten steps to a state action agenda—A guidebook of promising state and local practices*. Retrieved from <http://www.nga.org/files/live/sites/NGA/files/pdf/05WARNERGUIDE.pdf>
- National Governors Association Center for Best Practices, National Conference of State Legislatures, National Association of State Boards of Education, & Council of Chief State School Officers. (2008). *Accelerating the agenda: Actions to improve America's high schools*. Washington, DC: National Governors Association.
- Neuman, W. L. (2003). *Social research methods: Qualitative and quantitative approaches* (5th ed.). Boston, MA: Allyn & Bacon.
- Nilsson, J. E., Schmidt, C. K., & Meek, W. D. (2002). Reliability generalization: An examination of the career decision-making self-efficacy scale. *Educational and Psychological Measurement*, 62(4), 647–658.
- No Child Left Behind Act of 2001, 20 U.S.C. § 6301 (2002).
- North Dakota Department of Public Instruction. (n.d.). *ACT/WorkKeys and scholarships*. Retrieved from <http://www.dpi.state.nd.us/resource/act/act.shtm>
- Obama, B. (2010, February 22). *Remarks by the President and Vice President to the National Governors Association*. Retrieved from <http://www.whitehouse.gov/the-press-office/remarks-president-and-vice-president-national-governors-association>
- Olson, L. (2007). What does 'ready' mean? *Education Week*, 26(40), 7–8. Retrieved from <http://www.educationalliance.org/statescholars/downloads/whatdoesreadymean.pdf>

- O'Neil, H. F., Jr., Sugrue, B., Abedi, J., Baker, E. L., & Golan, S. (1997). *Final report of experimental studies on motivation and NAEP test performance (CSE Report 427)*. Retrieved from <http://www.cse.ucla.edu/products/reports.php>
- Osipow, S. H., & Fitzgerald, L. F. (1996). *Theories of career development* (4th ed.). Needham Heights, MA: Allyn & Bacon.
- Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research*, 66(4), 543–578.
- Pajares, F., & Graham, L. (1999). Self-efficacy, motivation constructs, and mathematics performance of entering middle school students. *Contemporary Educational Psychology*, 24, 124–139.
- Paris, S. G., Roth, J. L., & Turner, J. C. (2000). Developing disillusionment: Students' perceptions of academic achievement tests. *Issues in Education*, 6(1/2), 17–45.
- Perin, D., & Charron, K. (2006). Lights just click on every day. In T. Bailey & V. S. Morest (Eds.), *Defending the community college equity agenda* (pp. 155–194). Baltimore, MD: Johns Hopkins University Press.
- Perna, L. W., & Thomas, S. L. (2009). Barriers to college opportunity: The unintended consequences of state-mandated testing. *Educational Policy*, 23(3), 451–479. doi: 10.1177/0895904807312470
- Peter D. Hart Research Associates. (2005, February). *Rising to the challenge: Are high school graduates prepared for college and work? A study of recent high school graduates, college instructors, and employers*. Retrieved from <http://www.achieve.org/node/548>
- Phillips, S. D., & Blustein, D. L. (1994). Readiness for career choices: Planning, exploring, and deciding. *The Career Development Quarterly*, 43(1), 63–74.
- Planty, M., Hussar, W., Snyder, T., Kena, G., KewalRamani, A., Kemp, J., Bianco, K., & Dinkes, R. (2009). Indicator 12: Reading performance and achievement gaps. In *The Condition of Education 2009* (NCES 2009-081). Retrieved from <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2009081>
- Popham, W. J. (1999). Why standardized tests don't measure educational quality. *Educational Leadership*, 56(6), 8–15.
- Popham, W. J. (2003). *Test better, teach better: The instructional role of assessment*. Alexandria, VA: Association for Supervision and Curriculum Development.

- Powell, D. F., & Luzzo, D. A. (1998). Evaluating factors associated with the career maturity of high school students. *The Career Development Quarterly*, 47(2), 145–158.
- Roderick, M., & Engel, M. (2001). The grasshopper and the ant: Motivational responses of low-achieving students to high-stakes testing. *Educational Evaluation and Policy Analysis*, 23(3), 197–227.
- Rotundo, M., & Sackett, P. (2004). Specific versus general skills and abilities: A job level examination of relationships with wage. *Journal of Occupational & Organizational Psychology*, 77(2), 127–148.
- Russ-Eft, D., & Preskill, H. (2001). *Evaluation in organizations: A systematic approach to enhancing learning, performance, and change*. New York, NY: Basic Books.
- Salant, P., & Dillman, D. A. (1994). *How to conduct your own survey*. New York, NY: John Wiley & Sons.
- Secretary's Commission on Achieving Necessary Skills. (1991). *What work requires of schools: A SCANS report for America 2000*. Washington, DC: U.S. Department of Labor.
- Senate Bill 221, 14 SLA 10 (2010).
- Sijtsma, K. (2009). On the use, the misuse, and the very limited usefulness of Cronbach's alpha. *Psychometrika*, 74(1), 107–120.
- Spence, D. (2009, Spring). State college readiness initiatives and community colleges. *New Directions for Community Colleges*, 145, 95–101. doi: 10.1002/cc.358
- Stone, D. E. (2007). *Applied mathematics, locating information and reading for information of the WorkKeys assessments: Comparison of scores by age, race, and gender* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (UMI No. 3301909)
- Students Speak Out. (2008, June 11). *How does standardized testing impact students' motivation to learn?* (Issue Brief). Retrieved from <http://www.citizing.org/studentspeakout/findings>
- Super, D. E. (1968). A theory of vocational development. In D. Zytowski (Ed.), *Vocational behavior: Readings in theory and research* (pp. 121–129). New York, NY: Holt, Rinehart, & Winston.

- Suter, W. N. (1998). *Primer of educational research*. Boston, MA: Allyn & Bacon.
- The Conference Board, Corporate Voices for Working Families, Partnership for 21st Century Skills, & Society for Human Resource Management. (2006). *Are they really ready for work? Employers' perspectives on the basic knowledge and applied skills of new entrants to the 21st century U.S. workforce*. Retrieved from http://www.p21.org/documents/FINAL_REPORT_PDF09-29-06.pdf
- Tollefson, N. (2000). Classroom applications of cognitive theories of motivation. *Educational Psychology Review*, 12(1), 63–83.
- U.S. Chamber of Commerce Institute for a Competitive Workforce, & National Career Pathways Network. (2009). *Thriving in challenging times: Connecting education to economic development through career pathways*. Retrieved from <http://icw.uschamber.com/publication/thriving-challenging-times-connecting-education-economic-development-through-career-path>
- University of Alaska Anchorage Office of Institutional Effectiveness, Engagement, and Academic Support. (2009, June 30). *Measuring success with underprepared students: FY09 project report*. Retrieved from <http://www.uaa.alaska.edu/institutionaleffectiveness/success/underprepared-students.cfm>
- Work Ready/College Ready, 4 AAC § 06.715 and 06.717 (2010). Retrieved from [http://www.legis.state.ak.us/basis/folioproxy.asp?url=http://www.jnu01.legis.state.ak.us/cgi-bin/folioisa.dll/aac/query=\[JUMP:%274+aac+06!2E717%27\]/doc/{@1}?firsthit](http://www.legis.state.ak.us/basis/folioproxy.asp?url=http://www.jnu01.legis.state.ak.us/cgi-bin/folioisa.dll/aac/query=[JUMP:%274+aac+06!2E717%27]/doc/{@1}?firsthit)
- Zimmerman, B. J., & Cleary, T. J. (2006). Adolescents' development of personal agency: The role of self-efficacy beliefs and self-regulatory skill. In F. Pajares & T. Urdan (Eds.), *Adolescence and Education: Vol. 5. Self-efficacy beliefs of adolescents* (pp. 45–69).
- Zunker, V. G., & Osborn, D. S. (2002). *Using assessment results for career development* (6th ed.). Pacific Grove, CA: Brooks/Cole.

APPENDICES

Appendix A

Description of WorkKeys Assessments

| Assessment | Description | Format | Score Scale |
|--------------------------|---|---|--------------------------------------|
| Reading for Information* | Measures skills in reading and understanding using workplace documents such as memos, letters, policy manuals, and regulations. | Multiple choice 33 questions | Minimum: Level 3 Maximum: Level 7 |
| Locating Information* | Measures skills in using information presented graphically, such as maps, charts, and diagrams. | Multiple choice 38 questions | Minimum: Level 3 Maximum: Level 6 |
| Applied Mathematics* | Measures skills in applying mathematical reasoning to work-based problems | Multiple choice 33 questions | Minimum: Level 3 Maximum: Level 7 |
| Applied Technology | Measures problem-solving skills related to technology and principles such as mechanics, electricity, and fluid dynamics. | Multiple choice 34 questions | Minimum: Level 3 Maximum: Level 6 |
| Listening | Measures skills in listening to and understanding work-based audio messages. | Constructed response 6 messages | Minimum: Level 1 Maximum: Level 5 |
| Observation | Measures skills in observing videotaped workplace situations and noticing details. | Video and multiple choice 36 questions | Minimum: Level 3 Maximum: Level 6 |
| Teamwork | Measures skills in recognizing actions that support goals of a team in work-based situations. | Video and multiple choice 36 questions | Minimum: Level 3 Maximum: Level 6 |
| Business Writing | Measures skills in writing that are appropriate for business. | Constructed response 1 prompt | Minimum: Level 1 Maximum: Level 5 |

| Assessment | Description | Format | Score Scale |
|------------|---|------------------------------------|--------------------------------------|
| Writing | Measures skills in listening and summarizing information into written messages. | Constructed response 6 messages | Minimum: Level 1 Maximum: Level 5 |

Note: From “Characteristics of the WorkKeys Assessments,” by ACT, Inc., 2007, and “WorkKeys Test Descriptions,” by ACT, Inc., 1998. Copyright by ACT, Inc.

Adapted with permission.

*One of the set of three assessments necessary to earn a Career Readiness Certificate.

Appendix B

SCANS Competencies and Skills

| Competencies | Foundation Skills & Qualities |
|--|--|
| 1. Resources: Identifies, organizes, plans, and allocates resources <ol style="list-style-type: none"> a. Time b. Money c. Material & facilities d. Human resources | 1. Basic skills: Reads, writes, performs arithmetic and mathematical operations, listens and speaks <ol style="list-style-type: none"> a. Reading (includes locating information) b. Writing c. Arithmetic/mathematics d. Listening e. Speaking |
| 2. Interpersonal: Work with others <ol style="list-style-type: none"> a. Participates as member of a team b. Teaches others new skills c. Serves clients/customers d. Exercises leadership e. Negotiates f. Works with diversity | 2. Thinking skills: Thinks creatively, makes decisions, solves problems, visualizes, knows how to learn, and reasons <ol style="list-style-type: none"> a. Creative thinking b. Decision making c. Problem solving d. Seeing things in the mind's eye e. Knowing how to learn f. Reasoning |
| 3. Information: Acquires and uses information <ol style="list-style-type: none"> a. Acquires and evaluates information b. Organizes and maintains information c. Interprets and communicates information d. Uses computers to process information | 3. Personal qualities: Displays responsibility, self-esteem, sociability, self-management, and integrity and honesty <ol style="list-style-type: none"> a. Responsibility b. Self-esteem c. Sociability d. Self-management e. Integrity/honesty |
| 4. Systems: Understands complex interrelationships <ol style="list-style-type: none"> a. Understands systems b. Monitors and corrects performance c. Improves or designs systems | |

| Competencies | Foundation Skills & Qualities |
|--|-------------------------------|
| 5. Technology: Works with a variety of technologies <ul style="list-style-type: none"> a. Selects technology b. Applies technology to task c. Maintains and troubleshoots equipment | |

Secretary's Commission on Achieving Necessary Skills. (1991). *What work requires of schools: SCANS report for American 2000*. Washington, DC: U.S. Department of Labor.

Appendix C

Student Survey

Dear high school junior,

This survey is part of a research study approved by the Anchorage School District and conducted by Deanna Schultz as part of her dissertation research at Oregon State University. The purpose of the study is to gather your thoughts about college and career readiness after taking the WorkKeys Reading for Information, Locating Information, and Applied Mathematics tests.

Your participation in this research study is voluntary. If you choose to participate, please click “continue” and you will be directed to a survey that asks for your WorkKeys scores and your thoughts about college and career readiness. This anonymous survey will take no more than 10 minutes and should be completed in one session. You may leave questions blank if you don’t want to answer them, and if you start the survey and no longer want to complete it, you may exit at any time.

Your thoughts about the WorkKeys tests and college and career readiness are important to the school district in planning for future WorkKeys testing.

If you have any questions or concerns about the research, please feel free to contact Dr. Sam Stern, College of Education Dean, Oregon State University, at sam.stern@oregonstate.edu, or Deanna Schultz, Assistant Professor, Career and Technical Education, University of Alaska Anchorage, at 907-786-6364 or dschultz@uaa.alaska.edu

Thank you!

<<Continue>>

WorkKeys Results

The following questions are about the results of your WorkKeys tests. Please indicate your skill level score on each test and what you thought of your results.

1. My skill level score on the Reading for Information WorkKeys test was
 - Less than 3
 - 3
 - 4
 - 5
 - 6
 - 7

2. My results on the Reading for Information WorkKeys test were
 - Worse than I expected
 - What I expected
 - Better than I expected

3. My skill level score on the Locating Information WorkKeys test was
 - Less than 3
 - 3
 - 4
 - 5
 - 6

4. My results on the Locating Information WorkKeys test were
 - Worse than I expected
 - What I expected
 - Better than expected

5. My skill level score on the Applied Mathematics WorkKeys test was
 - Less than 3
 - 3
 - 4
 - 5
 - 6
 - 7

6. My results on the Applied Mathematics WorkKeys test were
 - Worse than I expected
 - What I expected
 - Better than I expected

- 7. Did you complete practice questions or practice WorkKeys tests before taking the official tests?
 - Yes
 - No

College and Career Readiness

- 8. Mark the number that best matches your level of agreement or disagreement with the statement given.

| | Strongly Disagree | Disagree | Agree | Strongly Agree |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
| | 1 | 2 | 3 | 4 |
| My WorkKeys results caused me to rethink my education options after high school. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I believe the WorkKeys results are useful in planning for education after high school. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| After seeing my WorkKeys results, I feel confident that I have the skills to be successful in college. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| There is no connection between my WorkKeys results and my education after high school. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

9. Mark the number that best matches your level of agreement or disagreement with the statement given.

| | Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|-----------------------|-----------------------|-----------------------|-----------------------|
| | 1 | 2 | 3 | 4 |
| After seeing my WorkKeys results, I feel confident that I have the skills to be successful in a career. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| My WorkKeys results caused me to consider career options that I had not thought about before. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I believe the WorkKeys results are useful in planning for my future career. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| There is no connection between my WorkKeys results and my career plans. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

10. Mark the number that best matches your level of agreement or disagreement with the statement below.

| | Strongly Disagree | Disagree | Agree | Strongly Agree |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
| | 1 | 2 | 3 | 4 |
| The WorkKeys tests were different than other tests I've taken. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I did my best to answer the WorkKeys test questions. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The WorkKeys tests were a waste of time. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

11. Mark the number of the response that best completes the statement.

| | Low | | | High |
|---|-----|---|---|------|
| | 1 | 2 | 3 | 4 |
| Before taking the WorkKeys tests, my confidence in my English skills was... | 0 | 0 | 0 | 0 |
| After taking the WorkKeys tests, my confidence in my English skills is... | 0 | 0 | 0 | 0 |

12. Mark the number of the response that best completes the statement.

| | Low | | | High |
|--|-----|---|---|------|
| | 1 | 2 | 3 | 4 |
| Before taking the WorkKeys tests, my confidence in my math skills was... | 0 | 0 | 0 | 0 |
| After taking the WorkKeys tests, my confidence in my math skills is... | 0 | 0 | 0 | 0 |

Personal Characteristics

Please provide the following information.

13. Gender
- Male
 - Female

14. Ethnicity

- African American/Black
- Alaska Native/American Indian
- Asian
- Hispanic
- Native Hawaiian/Other Pacific Islander
- White
- Multi-ethnic (2 or more races)

15. My current high school GPA is:

- 3.50 to 4.00
- 3.00 to 3.49
- 2.50 to 2.99
- 2.00 to 2.49
- 1.50 to 1.99
- 1.00 to 1.49
- Less than 1.0

<<Submit>>

Thank you for completing this survey. The results from all students will be combined and shared with your high school principals to help plan future WorkKeys testing.

Please close this Internet window.

Appendix D

Parent Notification Letter

Dear Parent or Guardian,

For the first time this school year, all Anchorage High School juniors had the opportunity to take the WorkKeys Reading for Information, Locating Information, and Applied Mathematics tests that measure basic skills employers seek in workers. Those skills are also comparable to skills colleges seek in first-time students.

In an effort to determine whether these test results are meaningful to students and help them think about college and career readiness, juniors at Bartlett High School will be asked to complete an electronic survey on February 17, after they receive their test results. This survey is the focus of my doctoral dissertation research at Oregon State University in the College of Education Community College Leadership Program under the supervision of Dr. Sam Stern. The survey will be completely anonymous and student participation in the survey is voluntary. Participation in this research may lead your student to seek out college and career planning guidance. A copy of the survey is posted on the school web site for your review.

The survey results will be analyzed during the spring and summer of 2011 and will be shared with Anchorage School District administrators by December 2011. Results of the research will be beneficial to district administrators in evaluating the WorkKeys testing program and planning WorkKeys advising sessions with students who take the tests in the future. Copies of the research results will be available upon request.

If you have questions about your students' rights or welfare as a participant, please contact the Oregon State University Institutional Review Board (IRB) Office, at (541) 737-8008 or by email at IRB@oregonstate.edu. If you have other questions about the survey or the research, please contact either Dr. Sam Stern at sam.stern@oregonstate.edu, the Oregon State University Institutional Review Board at IRB@oregonstate.edu, or myself by phone at (907) 786-6364 or email me at dschultz@uaa.alaska.edu. In the event you do not want your student to participate in this survey, please contact the Bartlett High School office at 742-1800.

Sincerely,
Deanna Schultz
Assistant Professor, CTE
UAA Community & Technical College
3211 Providence Dr., UC 130
Anchorage, AK 99508

Appendix E

Student Information Letter

Dear high school junior,

Congratulations on being among the first juniors in Alaska to take the WorkKeys Reading for Information, Locating Information, and Applied Math tests.

My name is Deanna Schultz and I am a doctoral student at Oregon State University conducting research about WorkKeys under the supervision of my major professor, Dr. Sam Stern. The purpose of my research is to find out what high school students like you think about college and career readiness related to the WorkKeys tests. I would like to invite you to be part of this research study by completing an electronic survey about your WorkKeys results and your thoughts related to these tests.

Your participation in the research study is completely voluntary and all responses will be anonymous. Most of your parents signed consent forms at the beginning of the school year that would allow you to participate in an anonymous survey. If you decide to participate in the survey, please check in at the computer lab to see if you have permission to complete the survey. If you start the survey and change your mind, you can stop at any time. If there are questions you don't want to answer, you can leave them blank. The survey may take up to 10 minutes and will ask for your WorkKeys scores, what you thought about the WorkKeys tests, and some of your thoughts about college and careers. All of your responses will be anonymous.

Since you are the first class of juniors to take these WorkKeys tests, your thoughtful responses to the survey are important to me and to the people who make decisions about using WorkKeys. Taking the survey might also be a learning opportunity for you. All survey responses will be combined, analyzed, and put into a report; no individual responses will be reported. In the reading I've done so far, I have not found any other research that asks high school students about their thoughts related to WorkKeys tests, so you could be the first.

If you have any questions about this research, please feel free to ask. I am available here today and am a professor at UAA in the Career and Technical Education Department, where I can be reached after today. You may also contact Dr. Sam Stern at sam.stern@oregonstate.edu. If you have questions about your rights or welfare as a participant, please contact the Oregon State University Institutional Review Board (IRB) Office, at (541) 737-8008 or by email at @oregonstate.edu.

Thank you for your time.

Sincerely,

Deanna Schultz
Assistant Professor, Career & Technical Education
UAA Community & Technical College
dschultz@uaa.alaska.edu

