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# Measurement of the quality of content preparation of post-secondary elementary-level teacher candidates participating in student teaching experiences during the fall of 2005 and spring of 2006: a pilot of the Iowa Department of Education Student Teacher Evaluation (IDESTE)

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**Measurement of the quality of content preparation of post-secondary elementary-level teacher candidates participating in student teaching experiences during the fall of 2005 and spring of 2006: A pilot of the Iowa Department of Education Student Teacher Evaluation (IDESTE)**

by

**Jeffrey George Berger**

A dissertation submitted to the graduate faculty  
in partial fulfillment of the requirements for the degree of  
**DOCTOR OF PHILOSOPHY**

Major: Education (Educational Administration)

Program of Study Committee:  
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Ames, Iowa

2006

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## DEDICATION

To my mother and father, George Berger and Judith Akers Berger, who have always supported and encouraged me while having my best interests at heart. To my wife Jean and my children, Jessica and Jenna, who have patiently supported me through this process.

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## ABSTRACT

This dissertation research investigated the validity and reliability of the Iowa Department of Education Student Teacher Evaluation (IDESTE) instrument and has provided initial comparisons of the IDESTE to other measures in the system. A team of experts, including staff members from the Department of Education, the K-12 system, and teacher preparation programs, developed the IDESTE. The initial form of the IDESTE was administered to every student teacher in the state in 2005-06 and results were aggregated by the Department of Education. A subsample of this overall sample was identified, and additional data were collected on this subsample to compare with IDESTE performance. The IDESTE was found to have good reliability, face validity, and construct validity. Concurrent validity was solid as well, despite the lack of variability of the IDESTE sample. Predictive validity could be determined through subsequent administrations of the IDESTE.

Findings from analysis of the IDESTE results indicate that cooperating teachers generally believe student teachers to have adequate content area preparation. In fact, roughly 60% of the scores submitted were “5” (highest score) on a 5-point range. While the other measures examined (ACT, Praxis I™, grade point average, and C-Base) all correlated more highly with each other, low to moderate correlations existed between these measures and the IDESTE results. This could mean that the instrument simply does not add value to this measurement of content competency, but that conclusion runs counter to the results of construct and face validity and of reliability. It is more likely that the IDESTE measures the construct of content adequacy in a different way than do

the other measures, which makes sense given that the IDESTE is more performance-based than any of the other measures (except for grade point average).

The pilot of this assessment suggests several implications for future practice, research, and development that should be considered for future programming and policy efforts. Attention to these implications and recommendations, described above, will contribute to moving the body of research forward and should help to ensure the provision of quality teachers in every learning environment in Iowa.

## Chapter 1

### INTRODUCTION

So, what do teachers know? That seems to be the sixty-four thousand dollar question, as policymakers and educators seek new answers in the debate of how to improve student achievement and reduce existing student performance gaps (Darling-Hammond, 2004). Over the last two decades, the topic of educational reform has taken on an increasingly standards-based and accountability-driven tone (Maas-Galloway, 2003). Beginning with the release of *A Nation at Risk* (The National Commission on Excellence in Education, 1983), continuing with the adoption of a set of national education goals included in *The National Education Goals Report: Building a Nation of Learners* (National Education Goals Panel, 1991), and culminating with enactment of the reauthorization of the *Elementary and Secondary Education Act (ESEA) of 2002*, commonly referred to as *No Child Left Behind (NCLB)*, public schools increasingly have been scrutinized on student performance and expected to make annual improvements (Berliner & Biddle, 1995). Today, schools must ensure that teachers are ready, willing, and able to produce students who are life-long learners, grounded in the basics, are properly prepared to seek additional education beyond the K-12 system, and are aware of career options and how to access those options (Marzano, 2004).

But, what does that mean for teachers, post-secondary students interested in the profession of teaching, and the higher education institutions that prepare them? Opinions vary widely on the best approach to improve student achievement and provide supports for teachers and pre-service teachers (Shanker, 1996). Current policy development conversations seem to sort into two very broad categories of effort: (1)

increasing the accountability of teachers and pre-teachers through the creation of national, state, or local performance standards including standardized measurement of teacher performance, and (2) providing adequate supports that serve to enhance the skills and knowledge of teachers (Darling-Hammond, 2000). Moreover, it seems that regardless of which approach to teacher development issue you support, one consistent theme in the overall conversation relates to teachers having adequate content knowledge preparation (Rowan, Correnti, & Miller, 2002).

But what is “adequate content knowledge,” and how does a college, university, school district, or state “know” that its teacher candidates or potential employees are adequately prepared? The current national expectation is contained within NCLB language and known by either the Highly Qualified Teacher or High Objective Uniform State Standard of Evaluation (HOUSSE) provision. Iowa’s approved NCLB Accountability Plan includes the following expectations for pre-service and working teachers under HOUSSE provisions:

#### Admission and Pre-service Levels

To be admitted to a teacher education program in Iowa, an individual must achieve a designated score on a basic skills entrance examination. Each candidate must demonstrate proficiency on rigorous standards and competencies through performance on multiple assessments on content knowledge, professional knowledge, and pedagogy. The assessment system of each teacher preparation institution is part of the approval process of the State Board of Education.

All teachers graduate from Iowa approved teacher preparation programs with a baccalaureate degree and have completed coursework equivalent to a major for the endorsements needed for specific teaching assignments. Each teacher candidate must be recommended by the college and complete a background check in order to obtain an initial license in Iowa.

#### Beginning Teacher Level

Each beginning teacher must successfully complete a two-year sequential mentoring and induction program based on the eight Iowa Teaching Standards. Standard #2 of the eight standards requires competence in subject matter or content knowledge. Each beginning teacher is also comprehensively evaluated on the Iowa Teaching Standards. The evaluation must be completed by an educator who has completed evaluator training, has demonstrated competence in the area of teacher evaluation, and holds administrative certification issued by the Board of Educational Examiners. The beginning teacher must demonstrate competence on the Iowa Teaching Standards as determined by the comprehensive evaluation to be recommended for a standard license.

#### Career (Non-beginning) Teacher Level

After July 1, 2005, all career teachers, or those who possess a standard license, will be evaluated on the Iowa Teaching Standards. These teachers must continue to demonstrate competence through performance evaluations conducted at least once every three years by a certified evaluator. Career teachers will have developed an individual career development plan that is aligned with the district's long-range student learning goals and the Iowa

Teaching Standards by July 1, 2005. Each school district must provide access to professional development opportunities. This access is available through the district's career development plan. This plan is included in the district's comprehensive school improvement plan (CSIP) that must be approved by and placed on file with the Iowa Department of Education. This career plan must align with the Iowa Teaching Standards, student achievement goals, and support the development needs of the district's teachers (Iowa Department of Education, 2005).

While the NCLB provision is working toward a consistent national expectation of teachers in the area of content knowledge, it is clear that the NCLB expectation leaves room for state flexibility. As a result, each state is expected to create a system of performance measures that will guarantee to the public that teachers "know" the areas in which they provide instruction.

This expectation is a topic of great controversy and the issue on which this research will focus: How should policymakers and educators best measure the content knowledge of working and pre-service teachers? Many researchers and policymakers believe that testing pre-service candidates on content knowledge is essential. Stoker & Tarrab (1984) and Salinger (1986) found a strong correlation between performance on the Pre-Professional Skills Test (PPST) or Praxis I™ test and other indicators of content knowledge such as grade point average in core subjects and the American College Test (ACT). Ayers (1988), Aksamit (1987), and Dobry, Murphy, and Schmidt (1985) found similar results with the National Teacher Examination (NTE). Winifred Nweke in 1999

found that the Georgia Teacher Certification Test (TCT) was a valid and reliable predictor of content knowledge of pre-service candidates.

However, many other researchers question the results of standardized assessments of pre-service or active teacher content knowledge, while other researchers believe that possessing other “content” beyond basic fact retention is important. McPhee and Kerr (1985) found that while scholastic aptitude correlates with teacher performance, other factors contribute to a greater degree to successful teaching. Hopfer (1999) found that portfolios containing work products were more accurate in assessing knowledge and predicting success than were content tests. Guyton and Farokhi (1987) and Ferguson and Womack (1993) found that content knowledge was necessary, but not sufficient, to predict success as a working teacher. Still others have found mixed results when looking at the predictive value of PPST and NTE assessments to success in teaching (Andrews, Blackmon, & Mackey, 1980; Evertson, Hawley, & Zlotnik, 1985; Heger & Salinger, 1985).

This mixed result leaves policymakers in a quandary: Do we directly test the content knowledge of our pre-service teachers, or are other existing methods in place that provide equal or greater assurance our future teaching force has the preparation necessary in areas of instruction to allow no child to be left behind?

#### Statement of Problem

If we assume that some level of content knowledge is necessary for every teacher and that the state, schools, and public should have an idea of whether a given teacher is adequately prepared in the content area in which she or he will teach, then what is the best policy approach to ensuring and validating the content adequacy of the

state's pre-service teaching force? This is the basic problem the Iowa Department of Education attempted to answer when it developed a pilot assessment tool called the Iowa Department of Education Student Teacher Evaluation (IDESTE).

The policy premise behind the development of the assessment tool was reasonably straightforward – the Iowa Department of Education leadership believed that measuring the adequacy of content knowledge was done better through a series of events over the long-term, using multiple methods of evaluation and multiple evaluators, than through a single paper and pencil content knowledge test. Iowa long has been a net exporter of well-qualified teachers (Iowa Department of Education, Condition of Education Report, 2005). Iowa's success in producing well-qualified teachers is seen in the recruitment of Iowa teachers by school districts in other states.

Within the teacher preparation system in Iowa, there are several benchmarks that create expectations for adequate content preparation. Before entering the classroom for the first time, pre-service teachers pass through several "gates" that serve to validate progress in multiple areas including content knowledge. Students are expected to: (1) successfully enter a college or university that contains a teacher preparation program, which usually includes taking either an ACT or SAT exam, (2) obtain a satisfactory score on the PPST/Praxis I™, C-BASE, or CAAP exam prior to entering the teacher preparation program, (3) successfully maintain a minimum grade point average in the core content areas of emphasis for the education endorsements of interest, (4) successfully demonstrate content knowledge on a variety of performance indicators imbedded in the program, (5) successfully pass a specified number of hours of field experience, normally including formal student teaching, (6) successfully obtain



an initial teaching license from the Iowa Board of Educational Examiners, and 6) successfully obtain a position with an employing school district.

It was with an understanding of this system that the Iowa Department of Education (the Department) created the IDESTE, which is simply an assessment tool that has the student teacher's cooperating teacher indicate by responding to a Likert-type item whether they believe the student's content knowledge is sufficient to allow her or him to be a successful teacher in Iowa. Department officials believed that allowing the cooperating teacher to observe a student over the course of several weeks and in a variety of venues and situations would provide that cooperating teacher with a more robust observation of the scope of content knowledge and, more important, of how that potential teacher integrates and applies the content knowledge in the delivery of instruction, than would any paper or pencil test.

The Department believed it was aligning this method of evaluating content knowledge process with a large body of research that finds meager to no research effect size between in-depth subject matter content tests and more effective teaching (Darling-Hammond, 2000; Ferguson & Womack, 1993). Instead, the Department elected to base its policy decision on the only existing research regarding content testing that shows correlations between grade point average, ACT or SAT tests scores, PPST/Praxis I™, C-BASE, or CAAP exam scores, and other measurements of content knowledge like the Praxis II™ and the National Teacher Exam (NTE) (Andrews, Blackmon, & Mackey, 1980; Ayres & Qualls, 1979; Blue, 2002; Ferguson & Womack, 1993; Guyton & Farokhi, 1987; Nweke, 2001). Despite the move nationally to implement end-of-program, pre-licensing content knowledge assessments like the Praxis II™, the

Department is saying simply that the assessment of the cooperating teacher is a more comprehensive and better evaluation of adequacy of content knowledge than is a single paper-and-pencil content knowledge test. The basic problem this research attempts to answer is whether that assumption is accurate based on the initial results of the pilot. The data analyzed through this research will provide critical guidance to Iowa Department of Education and U.S. Department of Education officials on the validity and reliability of the IDESTE, which in turn will influence future policy discussions as policymakers attempt to meet current federal expectations and maintain the trust of their publics.

### Study Purpose and Objectives

The purpose of this dissertation is to determine whether the IDESTE is a valid and reliable measure of the content knowledge in reading, mathematics, science, and social studies of pre-service student teachers in the fall of 2005 that are seeking elementary education endorsement. An additional purpose is to determine whether the IDESTE is an instrument equal to or better than other measures of content knowledge adequacy of prospective teachers like ACT, grade point average, and pre-admissions content assessments like the Praxis I™, C-Base, and CAAP exams.

A committee comprised of Department of Education personnel and representatives from teacher preparation institutions and K-12 school districts in the summer of 2005 created the IDESTE assessment tool. The assessment tool was completed by the cooperating teacher of every student teacher in the State of Iowa in the 2005-06 school year. From this pool of candidates, those seeking elementary education endorsements were selected as the sampling frame. Some current teacher

education programs in Iowa offer the Praxis II™ to their teacher education students. From the sampling frame, a 300 student sample was used to compare the results of the IDESTE to ACT/SAT, grade point average, and either the PPST/Praxis I™, C-BASE, or CAAP exams. All student teachers in the sampling frame that took the Praxis II were invited to participate in that portion of the study. The description of the sampling procedures and details are included in Chapter 3.

From the selected sample, the following data were collected and analyzed: (1) IDESTE assessment tool results, (2) ACT or SAT test scores, (3) grade point averages, (4) PPST/Praxis I™, C-BASE, or CAAP exam scores, and (5) Praxis II™ exam scores. These data were analyzed using the methodology included in Chapter 3.

#### Significance of Study

On the issue of the impact of subject matter and education coursework on teaching performance, Ferguson and Womack (1993) summarized the conversation at the time in this way:

The debate over this issue has historically been on ideological rather than empirical grounds. This is evidenced in the prominent reform documents of the last decade. In *A Nation at Risk* (1983), the authors contended that teacher preparation programs are too heavily weighted with “courses in educational methods at the expense of courses in subjects to be taught.” ... None of the statements concerning the relative effects of subject matter and education coursework contained in these reports is supported by evidence....

The debate continues on ideological rather than empirical grounds. It is time for a more rational approach requiring the accomplishment of two tasks: an

assessment of the existing empirical evidence on the relative effect of education and subject matter coursework on teaching performance and student learning and further research on the subject.

This statement appears to apply still in today's context. It is quite possible, some will say probable, that the Iowa Department of Education will lose the ideological battle related to the implementation of an end-of-program content knowledge assessment of prospective new teachers. However, the Department of Education would like to discover whether the empirical evidence suggests that a statewide investment in another layer of accountability for prospective teachers will yield any benefit to the system. If the IDESTE results prove to be as effective as other measures at measuring content level knowledge, this could have both short-term and long-term policy implications.

The short-term implications would include a validation of the quality of Iowa's current system of teacher preparation. This evidence could allow Iowa to document compliance with federal NCLB Highly Qualified Teacher requirements, and could save state lawmakers, colleges/universities, and teacher candidates the expense of implementing another unfunded federal assessment mandate.

The long-term implications would include the potential to stem the movement toward the federalization of America's education system, the provision of additional empirical research information to inform the ideological debate over the link between content knowledge and student or teacher performance, and could push policymakers and researchers beyond the "one-size-fits-all" mentality driving accountability conversations. It will become evident through the review of literature in Chapter 2 that

Ferguson and Womack's statement about the need for additional research in this area clearly is true.

#### Limitations of the Study

The students included in this study were selected at random, but from a pool of candidates that was not random. The study was limited to the pool of student teachers in Iowa in the 2005-06 school year. The comparison between the IDESTE and Praxis II™ was limited further to a sampling of student teachers that completed the Praxis II™ exam, which, in Iowa, tends to be students in teacher preparation programs closer to the borders of other neighboring states that require the Praxis II™. Consequently, while some students from Regents institutions were included, the balance of participants favors accredited nonpublic four-year teacher preparation programs. It is also unknown whether this group of student teachers is roughly comparable to other groups of student teachers relating to performance.

The assessment tool, although developed by an advisory group of stakeholders, was not piloted with a smaller group before it was implemented due to the federal requirement for immediate action. The decision by the Department of Education was to involve all student teachers and their cooperating teachers in the event that the assessment tool was an approvable method of determining Highly Qualified Status once the data were analyzed per this dissertation. Caution should be used in making definitive conclusions based on the results of the data analysis from this pilot assessment tool.

The use of a perception assessment tool was another limitation of the study. The disadvantages of perceptual assessment tools are grouped under three headings:

sample-related, questionnaire construction, and administration. Cooperating teachers were not given the option of not participating because of short timelines and the Department's need for compliance data. Student teachers obviously were given the option of opting out of the study, which required the submission of other data for the research analysis. The short implementation timelines for the Department of Education also could have prevented clear understanding of the language and terms used in the assessment tool, despite efforts to coach cooperating teachers on the process to complete the assessment tool. The assessment tool also was limited in choices for each content area, an issue that already has been identified for correction in future assessment tools. For example, cooperating teachers rated science knowledge on a Likert-type item, when the assessment tool could have, but did not, ask about detailed content knowledge in subcategories like physical science and biology, among others. The researcher was not in control of the final assessment tool products, so the ability to control the order of questions or to provide descriptive instructions was limited.

The researcher also was not in control of the actual completion of the assessment tool. While there is no evidence of misuse of the assessment tool, it is possible that procedures for the completion of the assessment tool differed within different teacher preparation programs.

There also were differences in names of courses on transcripts submitted. For comparability purposes, the Department of Education used Board of Educational Examiners cross-referencing tables to determine which courses were considered within the core content courses used for potential licensure, but it is possible the differences occurred within core course comparisons between programs.

## Conceptual and Operational Definitions

**Accountability:** any process implemented to demonstrate or validate the performance of the individual or group in question on specified measures.

**Adequacy:** meeting a mutually agreed upon minimally acceptable standard.

**Board of Educational Examiners:** the independent entity in Iowa responsible for issuing educational licenses.

**CAAP:** The Collegiate Assessment of Academic Proficiency (CAAP) is the standardized, nationally normed assessment program from ACT that enables postsecondary institutions to measure, evaluate, and enhance the outcomes of their general education programs including basic content knowledge competency.

**C-BASE:** Developed in the late 1980s, College BASE is a criterion-referenced achievement examination that serves two purposes: to qualify individuals for entry into teacher education programs and to test general academic knowledge and skills in campus-wide assessment programs. College BASE content is organized into four subject areas: English, mathematics, science, and social studies.

**Content knowledge:** for this study, it is the knowledge a teacher or pre-service teacher possesses in the designated field of instruction.

**Cooperating teacher:** a teacher employed by a public school district or accredited nonpublic school that is supervising the field experience of the student teacher.

**Core content:** defined for this study as delivery of instruction in four broad areas of licensure: (1) English/language arts/reading, (2) mathematics, (3) science, and (4) social studies. Colleges will use different terminology to group courses taken.

**Elementary and Secondary Education Act (ESEA):** federal legislation also known as the No Child Left Behind Act. This Act establishes funding and expectations for Title I programs, among many others. Any entity accessing any of the funding within ESEA is expected to comply with the provisions of the Act. States currently are not authorized to “opt out” of participation.

**Highly Qualified Teacher:** also known as the High Objective Uniform State Standard of Evaluation (HOUSSE) provision, which creates an expectation for the content preparation of every teacher providing direct instruction in a specific field of core course study.

**Iowa Department of Education Student Teacher Evaluation (IDESTE):** an assessment tool developed by the Department of Education, with a group of affected stakeholders. The intent of the assessment tool is to document compliance with Highly Qualified Teacher expectations under NCLB.

**Iowa Department of Education:** the state agency responsible for oversight of the preK-14 education system in Iowa.

**Likert scale:** a system first used by Rensis Likert in 1932 that allowed for the categorization of perceptual ratings on various issues.

**Praxis I™:** is a basic skills assessment of prospective teacher preparation program participants (prior to admission into an approved teacher preparation program). The Praxis I™ is also known as the Pre-Professional Skills Test, or PPST.

**Praxis II™:** is a series of end-of-preparation-program, pre-licensure assessments of content knowledge and pedagogy produced by the Educational Testing Service. The Praxis II™ is the next generation version of the National Teacher



Examination (NTE). The National Teacher Examinations have been in use since 1940 to assess the knowledge of teachers. They were administered first by the American Council on Education.

**Student Teacher/pre-service teacher:** is any student participating in a full-time field experience intended to be a culmination of skills and knowledge obtained in a teacher preparation program and to validate readiness for entry into the teaching profession.

**Teacher:** is any properly licensed employee of a public school district or accredited nonpublic school who has the responsibility of delivering instruction in a given field or fields of study.

**Teacher preparation program:** is a state-approved program within a four-year institution of higher education and is designed to produce teachers ready for the workforce.

### Summary

Chapter 1 discussed the necessity for the development of an assessment tool, the IDESTE, to validate prospective teachers' content knowledge in their given fields of study. The Iowa Department of Education is considering the first application of this assessment tool to be a pilot and this dissertation is intended to determine whether the instrument is a valid and reliable measure of content knowledge and whether the IDESTE produces results comparable to those of the Praxis II™ exam. A review of existing literature (Chapter 2) indicates a clear need for additional research on the relationship between content knowledge (and its measurement) and teaching proficiency. The chapter also described the purpose of the proposed dissertation

research along with a brief discussion of the potential pool of study candidates and the data examined. In addition, potential limitations of the study were outlined. The chapter concluded with the goals of the study and the conceptual and operational definitions that will be used throughout the dissertation.

## Chapter 2

### A REVIEW OF THE LITERATURE

This chapter provides the background and theoretical framework for the study. The literature review is organized by themes. First, research addressing teacher characteristics that affect student learning is addressed, including a focus on content knowledge preparation. Second, what the literature says about components of quality teacher preparation programs is identified, again specifically examining content preparation as a component of the overall preparation program. Finally, is a review of what the studies say about methods to validate pre-service teacher competency, specifically focusing on the validity and reliability of methods of measuring content adequacy using content knowledge assessment instruments and processes, is reviewed.

#### Teacher Variables that Impact Student Learning

Education, particularly public education, continues to face increased pressure to produce high-quality learners. Some of the most vocal critics question whether schools and teachers really can make a difference in student learning. There is, however, a growing body of research showing positive learner effects and that substantial portions of those positive effects are a result of high-quality teachers (Jordan, Mendro, & Weerasinghe, 1997). Recent studies of instructional effects at the classroom level using the Tennessee Value-Added Assessment System have found teacher effectiveness to be a primary factor related to differences in student learning, far exceeding the effect created by differences in class size and student demographics (Sanders & Rivers, 1996; Wright, Horn, & Sanders, 1997). Additionally, these same studies found that

students assigned to several ineffective teachers in a row had significantly lower achievement and gains in achievement than did those who were assigned to several highly effective teachers in a row (Sanders & Rivers, 1996). It also appears that these effects are cumulative. These studies also found a disturbing equity trend, noting differences in assignment of students to teachers of different effectiveness levels (Jordan, Mendro, & Weerasinghe, 1997), including one result that noted African American students are nearly twice as likely to be assigned to the most ineffective teachers and half as likely to be assigned to the most effective teachers (Sanders & Rivers, 1996). Song and Christiansen (2001) found a similar result in that the least able teachers typically were assigned to the neediest students.

It appears that research on teacher variables that contribute to positive student learning effects include academic ability, years of education, years of teaching experience, quality and quantity of subject matter knowledge, depth of teaching knowledge, certification status, and teaching behaviors in the classroom (Darling-Hammond, 2000).

### **General Academic Ability and Intelligence**

Studies as long ago as the 1940s found positive relationships between teaching performance and teachers' intelligence (usually measured by IQ) or general academic ability (Hellfritsch, 1945; LaDuke, 1945; Skinner, 1947). Most of these relationships were small and not statistically significant. Two reviews concluded that little or no relationship exists between teachers' measured intelligence and their students' achievement (Schalock, 1979; Soar, Medley, & Coker, 1983). Browne and Rankin (1986) and McCutcheon, Schmidt, and Bolden (1991) found that teachers considered

“bright” on measured intelligence tests were less likely to be employed than those who were highly rated by their student teaching supervisors. However, other studies suggest that teachers' verbal ability is related to student achievement (Coleman et al., 1966; Hanushek, 1971), and that this relationship may vary with different groups of students (Summers & Wolfe, 1975). Verbal ability may be a more accurate measure of teachers' abilities to convey ideas in clear and convincing ways than are general measures of intelligence (Murnane, 1985).

### **Subject Matter Knowledge**

Subject matter knowledge is another variable that appears related to teacher effectiveness, although the findings are not as strong and consistent as might be supposed. Studies of teachers' scores on the subject matter tests of the National Teacher Examinations (NTE) and Praxis II™ examinations have found little or no consistent relationship between this measure of subject matter knowledge and teacher performance as measured by student outcomes or supervisory ratings. Most studies show small positive and negative relationships (Andrews, Blackmon, & Mackey, 1980; Ayers & Qualls, 1979; Haney, Madaus, & Kreitzer, 1986; Quirk, Witten, & Weinberg, 1973; Summers & Wolfe, 1975).

In 1983, Byrne summarized the results of 30 studies relating teachers' subject matter knowledge to student achievement. The teacher knowledge measures were either a subject knowledge test (standardized or researcher-constructed) or number of college courses taken within the subject area. The results of these studies were mixed, with 17 showing a positive relationship and 14 showing no relationship. However, many of the "no relationship" studies had so little variability in the teacher knowledge measure

that insignificant findings were almost a certainty. Ashton and Crocker (1987) found only five of 14 studies reviewed that exhibit a positive relationship between measures of subject matter knowledge and teacher performance. In 2000, Friedman concluded that there is “little support for the impact of teachers’ subject knowledge on student learning.”

It may be that these results are mixed because subject matter knowledge is a positive influence up to some minimal level of competence but is less important beyond that minimum threshold. For example, a controlled study of middle school mathematics teachers, matching years of experience and school settings, found that students of fully certified mathematics teachers experienced significantly larger gains in achievement than did those taught by teachers not certified in mathematics (Hawk, Coble, & Swanson, 1985). However, Begle and Geeslin (1972) found in a review of mathematics teaching that the absolute number of course credits in mathematics was not linearly related to teacher performance.

It makes sense that knowledge of the material is related to quality teaching, but also that student gains from subject matter expertise would decrease beyond some minimal level that exceeds the demands of the curriculum being taught. This concept is supported by Monk's (1994) study of mathematics and science achievement, which found a positive, but curvilinear, relationship with student achievement in mathematics and science, exhibiting diminishing increases in student achievement as teachers' subject matter courses surpassed a minimum threshold level (e.g., five courses in mathematics).

It also may be that the way subject matter knowledge is measured makes a difference in the findings. Measures of numbers of courses completed in a subject area

have been more frequently found to be related to teacher performance more frequently than have scores on tests of subject matter knowledge. This might be because tests capture a narrower slice of content. In the United States, most teacher tests use multiple-choice measures that are limited in assessing teachers' ability to analyze and apply knowledge (Darling-Hammond, 1986). Some researchers suggest that the United States look to content knowledge assessment systems in other countries because they focus more on application and analysis skills (APEC Education Form, 1995).

Despite concerns that education majors may be less well prepared in their subject areas than are academic majors (Weglinsky, 2000), comparisons of teachers with degrees in education vs. those with degrees in disciplinary fields have found no relationship between degree type and teacher performance (Murnane, 1985). This may be because certification requirements reduce the differences in course backgrounds found for teachers among various degree types. For example, many states require the equivalent of an academic major or minor in the field as part of the education degree for high school teachers, regardless of the department granting the degree (NASDTEC, 1997). Given the standardizing influences of licensing requirements within states but substantial differences in licensing requirements across states, within-state studies are likely to find less variation in teachers' education backgrounds than might be found in cross-state studies.

### **Knowledge of Teaching and Learning**

The research has found a stronger, more consistently positive effect related to education coursework and a teacher's effectiveness. Ashton and Crocker (1987) found significant positive relationships between education coursework and teacher

performance in four of seven studies they reviewed. Evertson, Hawley, and Zlotnik (1985) reported a consistent positive effect of teachers' formal education training on supervisory ratings and student learning, with 11 of 13 studies showing greater effectiveness for fully prepared and certified vs. uncertified or provisionally certified teachers. With respect to subject matter coursework, five of eight studies reviewed found no relationship; the other three found small associations.

Reviewing the National Longitudinal Study of Mathematical Abilities, Begle (1979) found that the number of credits a teacher had in mathematics methods courses was a stronger indicator of student performance than was the number of credits in mathematics courses or other indicators of preparation. Similarly, Monk's (1994) study of student's mathematics and science achievement found that teacher education coursework had a positive effect on student learning and sometimes was more influential than additional subject matter preparation. In an analysis of teaching techniques, Reynolds (1992) found that teachers' major area coursework credits generally were not significantly related to student learning, but coursework in areas that developed specific skills created positive relationships. For example, teachers with greater training in science teaching were more likely to use laboratory techniques and discussions, emphasizing conceptual applications of ideas, while those with less education training placed more emphasis on memorization.

In a study of more than 200 graduates of a single teacher education program, Ferguson and Womack (1993) examined the influences on 13 dimensions of teaching performance of education and subject matter coursework, NTE subject matter test scores, and GPA in the student's major. They found that the amount of education



coursework completed by teachers explained more than four times the variance in teacher performance (16.5%) than did measures of content knowledge (NTE scores and GPA in the major), which explained less than 4%. In a similar study, which compared the effect of different kinds of knowledge on 12 dimensions of teacher performance for more than 270 teachers, Guyton and Farokhi (1987) found consistently strong, positive relationships between teacher education coursework performance and teacher performance in the classroom as measured through a standardized observation instrument, while relationships between classroom performance and subject matter test scores were positive but insignificant and relationships between classroom performance and basic skill scores were almost nonexistent. Another program-based study by Denton and Lacina (1984) found positive relationships between the extent of teachers' professional education coursework and their teaching performance, including their students' achievement.

It may be that the positive effects of subject matter knowledge are offset by knowledge of how to teach the subject to various kinds of students. In other words, the degree of pedagogical skill may combine with subject matter knowledge to enhance or reduce teacher performance. As Byrne (1983) suggested:

It is surely plausible to suggest that insofar as a teacher's knowledge provides the basis for his or her effectiveness, the most relevant knowledge will be that which concerns the particular topic being taught and the relevant pedagogical strategies for teaching it to the particular types of pupils to whom it will be taught.

If the teacher is to teach fractions, then it is knowledge of fractions and perhaps

of closely associated topics that is of major importance.... Similarly, knowledge of teaching strategies relevant to teaching fractions will be important.

The kind and quality of in-service professional development as well as pre-service education seems to make a difference in developing this knowledge. Several recent studies have found that higher levels of student achievement are associated with teachers' opportunities to participate in sustained professional development grounded in content-specific pedagogy linked to the new curriculum they are learning to teach (Brown, Smith, & Stein, 1995; Cohen & Hill, 1997; Wiley & Yoon, 1995). In these studies, both the kind and extent of professional development mattered for teaching practice and for student achievement.

The National Assessment of Educational Progress (NAEP) also has documented how specific kinds of teacher learning opportunities are related to students' reading achievement. On average over the last 30 years, 4th grade students of teachers who were fully certified, had master's degrees, and had professional coursework in literature-based instruction did better than other students on reading assessments (NCES, 2005). While these relationships were modest, the relationships between specific teaching practices and student achievement often were quite apparent, and these practices were related to teacher learning opportunities. NAEP analyses found that teachers who had had more professional training were more likely to use teaching practices that are associated with higher reading achievement on the NAEP tests, namely use of trade books and literature, integration of reading and writing, and frequent visits to the library, and were less likely to engage in extensive use of reading kits, basal readers,

workbooks, and multiple choice tests for assessing reading, practices that the NAEP analyses found to be associated with lower levels of student achievement.

Interestingly, students of teachers who had had more training in phonics instruction did noticeably less well than did other students in both years. Often, this kind of training is focused heavily on the use of basal readers and workbooks rather than an integrated approach that teaches decoding skills in the context of other important reading skills and language development strategies.

Other studies have found that students achieve at higher levels and are less likely to drop out when they are taught by teachers with certification in their teaching field, with master's degrees, and enrolled in graduate studies (Council for School Performance, 1997; Sanders, Skonie-Hardin, & Phelps, 1994). However, like the NAEP analyses described above, these are simple correlational studies that do not take into account other school resources or student characteristics like poverty or language background that also may affect student performance.

On-going continuous learning also may matter to teacher performance. Penick and Yager (1983) found that teachers in exemplary science programs had higher levels of education and more recent educational experiences than did others, even though they were older than the average science teacher was. Tell (2000) found that teachers participating in ongoing support through the Standards-based Education Project (STEP) that focused broadly on 15 areas of teacher practices performed better than the control group prepared by a traditional program. As Murnane (1985) suggests, these findings may indicate that it is not only the knowledge acquired with ongoing professional

development but also the teacher's enthusiasm for learning that relates to increased student achievement.

### **Teaching Experience**

Research on the relationship between teachers' effectiveness and their years of experience shows positive student learning effects (Murnane & Phillips, 1981), but not always significant ones. While many studies have established that inexperienced teachers (those with less than three years of experience) are less effective than more experienced teachers, the benefits of experience appear to level off after about five years, especially in work settings where the teacher is working in isolation from other teachers (Rosenholtz, 1986). Veteran teachers in settings that emphasize continual learning and collaboration continue to improve their performance (Rosenholtz, 1986). Similarly, very well prepared beginning teachers can be highly effective. For example, some recent studies of 5-year teacher education programs, programs that include a bachelor's degree in the discipline and master's in education as well as a yearlong student teaching placement, have found graduates to be more confident than graduates of 4-year programs and as effective as more senior teachers (Andrew & Schwab, 1995; Denton & Peters, 1988).

### **Certification Status**

Certification status is a measure that typically includes knowledge about subject matter and knowledge about teaching and learning. The components of certification vary across the states due to differences in licensing requirements, but a standard certificate generally means that a teacher has been prepared in a state-approved teacher education program at the undergraduate or graduate level and has completed

either a major or a minor in the field(s) to be taught plus anywhere from 18 to 40 education credits, depending on the state and the certificate area, including between 8 and 18 weeks of student teaching. (The norm is about 30 education credits and about 12 to 15 weeks of student teaching.) Individual teacher education programs often require more preparation than the state demands in education, in clinical practice, and in the content area(s) to be taught. Most states now also require one or more tests of basic skills, subject matter knowledge, and/or teaching knowledge or skills as the basis for the initial or continuing license or for admission to teacher education (NASDTEC, 1997). Iowa recently joined this movement by requiring the Praxis II exam for licensing in addition to the IDESTE (Department of Education, 2006).

While most states have been increasing their standards since the 1980s, more than 30 states still allow the hiring of teachers who have not met their licensing standards, a practice that has been on the increase in some states as demand has grown in recent years (NASDTEC, 1997). Some allow the hiring of teachers with no license. Others issue emergency, temporary, or provisional licenses to candidates who, depending on the state, may or may not have met varying requirements (e.g., a bachelor's degree, a certificate in another teaching field, a basic skills test). More than 40 states, including Iowa to a limited degree, also have initiated alternate route provisions for candidates who enter through post-baccalaureate degree programs. Most of these are master's degree programs that offer an education degree that meets all of the normal state requirements but does so in an individualized way. Some states allow candidates to complete a short summer course of study and assume full teaching responsibilities, with or without completing additional coursework.

In times of relatively low demand, like most of the 1980s, virtually all teachers were certified and there was too little variability to find effects of this variable in large-scale studies. Most studies of the influence of training and certification on teacher performance are from the high-demand era of the 1960s and 1970s and from the 1990s when demand increased again. Studies in different subject matter fields that compare teachers with and without preparation typically have found higher ratings and greater student learning gains for teachers who have more formal preparation for teaching. In addition to the studies of science and mathematics teachers cited earlier, these include reading and elementary education (McNeil, 1974), early childhood education (Roupp et al., 1979), gifted education (Hansen, 1988), and vocational education (Erekson and Barr, 1985). In a review of research, Evertson, Hawley, and Zlotnik (1985) concluded:

(T)he available research suggests that among students who become teachers, those enrolled in formal preservice preparation programs are more likely to be effective than those who do not have such training. Moreover, almost all well planned and executed efforts within teacher preparation programs to teach students specific knowledge or skills seem to succeed, at least in the short run.

Other studies point out the differences in the perceptions and practices of teachers with differing amounts and kinds of preparation. A number of studies suggest that the typical problems of beginning teachers are lessened for those who have had adequate preparation prior to entry (Cornett, 1994; Darling-Hammond, 2000; Sindelar, Daunic, & Rennells, 2004). Studies of teachers admitted with less than full preparation, with no teacher preparation or through very short alternate routes, have found that such recruits tend to be less satisfied with their training (Darling-Hammond, 2004), and they

tend to have greater difficulties planning curriculum, teaching, managing the classroom, and diagnosing students' learning needs (Bents & Bents, 1990; Feiman-Nemser & Parker, 1990; Gomez & Grobe, 1990; Grady, Collins, & Grady, 1991; Lenk, 1989; National Center for Research on Teacher Learning, 1992; Rottenberg & Berliner, 1990). Principals, supervisors, and colleagues tend to rate them less highly on their instructional skills (Bents & Bents, 1990; Feiman-Nemser & Parker, 1990; Gomez & Grobe, 1990; Lenk, 1989), and they tend to leave teaching at higher-than-average rates (Darling-Hammond, 2002; Stoddart, 1992).

These findings are reflected in Gomez and Grobe's (1990) study of the performance of alternate route candidates in Dallas, who receive a few weeks of summer training from the district before they assume full teaching responsibilities. Although these candidates were rated near the average on some aspects of teaching, they were rated lower on such factors as their knowledge of instructional techniques and instructional models. The performance of alternate route candidates also was much more uneven than that of trained teachers, with a much greater proportion of them rated "poor" on each of the teaching factors evaluated. The strongest effects of this unevenness were seen in students' achievement in language arts, where the adjusted achievement gains of students of alternate route teachers were significantly lower than those of students of traditionally trained teachers.

Some recent multivariate studies of student achievement at the school and district level have found a major influence of teachers' qualifications on what students learn, especially when scores on licensing examinations are included. In an analysis of nearly 900 Texas school districts that evaluated the effects of many school input

variables and controlled for student background and district characteristics, Ronald Ferguson (1991) found that combined measures of teachers' expertise (scores on a licensing examination, master's degrees, and experience) accounted for more of the inter-district variation in students' reading and mathematics achievement (and achievement gains) in grades 1 through 11 than did student socioeconomic status. Lower pupil-teacher ratios and smaller schools made an additional, smaller contribution to student achievement in the elementary grades.

Strauss and Sawyer (1986) found results similar to Ferguson's:

Of the inputs which are potentially policy-controllable (teacher quality, teacher numbers via the pupil-teacher ratio and capital stock), our analysis indicates quite clearly that improving the quality of teachers in the classroom will do more for students who are most educationally at risk, those prone to fail, than reducing the class size or improving the capital stock by any reasonable margin which would be available to policy makers.

When student characteristics are held constant, the relationship of teachers' qualifications to student achievement is even more significant (Ferguson, 1998; Ferguson & Ladd, 1996; Strauss & Sawyer, 1986).

A study of high school students' performance in mathematics and science using data from the National Educational Longitudinal Studies of 1988 (NELS) found that fully certified teachers have a statistically significant positive impact on student test scores relative to teachers who are not certified in their subject area, as do teachers who hold a degree in mathematics or mathematics education (Goldhaber & Brewer, 1999).

Furthermore, in states with licensing examinations, newly trained teachers (those with



probationary licenses granted to fully qualified new teachers) have a strong positive influence on student achievement.

A more recent Texas study (Fuller, 1999) found that students in districts with greater proportions of licensed teachers were significantly more likely to pass the Texas state achievement tests, after controlling for student socioeconomic status, school wealth, and teacher experience. Teacher licensing was especially influential on the test performance of elementary students. In a recent school-level analysis of mathematics test performance in California high schools, Fetler (1999) found a strong negative relationship between average student scores and the percentage of teachers on emergency certificates, as well as a smaller positive relationship between student scores and teacher experience levels, after controlling for student poverty rates.

These findings about the influences and relative contributions of teacher training and experience levels are reinforced by several studies (*Education Week*, 2005; Rowan, Correnti, & Miller, 2002; Tell, 2000; Weglinsky, 2000) finding that teacher education, ability, and experience, along with small schools and lower teacher-pupil ratios, are associated with increases in student achievement across schools and districts. Rowan, Correnti, and Miller (2002) found related to achievement gains associated with expenditure increments on various resources, that spending on teacher education was the most productive investment for schools, outstripping the effect of teacher experience and reduced pupil/teacher ratios.

### **Teacher Behaviors and Practices**

While these studies suggest that there are aspects of teaching effectiveness that may be related to teacher education, certification status, and experience, they do not

reveal much about what it is about teachers' behaviors or abilities that makes the difference in how their students perform. Research on teachers' personality traits and behaviors has produced few consistent findings (Druva & Anderson, 1983), with the exception of studies finding a recurring positive relationship between student learning and teachers' "flexibility," "creativity," or "adaptability" (Berliner & Tikunoff, 1976).

Successful teachers tend to be those who are able to use a range of teaching strategies and a range of interaction styles, rather than a single, rigid approach (Darling-Hammond, 2002). This finding is consistent with other research on effective teaching, which suggests that effective teachers adjust their teaching to fit the needs of different students and the demands of different instructional goals, topics, and methods (Darling-Hammond, 2000; Ferguson & Womack, 1993; Reynolds, 1992; Song & Christiansen, 2001).

In addition to the ability to create and adapt instructional strategies, strong research support has linked student learning to variables such as teacher clarity, enthusiasm, task-oriented behavior, variability of lesson approaches, and student opportunity to learn criterion material. Teachers' abilities to structure material, ask higher order questions, use student ideas, and probe student comments also have been found to be important variables in what students learn (Song & Christiansen, 2001; Tell, 2000; Wise & Darling-Hammond, 1992). No single instructional strategy has been found to be unvaryingly successful; instead, teachers who are able to use a broad repertoire of approaches skillfully (e.g., direct and indirect instruction, experience-based and skill-based approaches, lecture, and small group work) typically are most successful. The use of different strategies occurs in the context of "active teaching" that is purposeful

and diagnostic rather than random and that responds to students' needs as well as curriculum goals (Darling-Hammond, 2004).

Teacher education appears to influence the use of these practices. Teachers who have had formal preparation have been found to be better able to use teaching strategies that respond to students' needs and learning styles and that encourage higher order learning (Cornett, 1984; Hansen, 1988). It is suggested that since the novel tasks required for problem-solving are more difficult to manage than the routine tasks associated with rote learning, lack of knowledge about how to manage an active, inquiry-oriented classroom can lead teachers to turn to passive tactics that "dumb down" the curriculum, busying students with workbooks rather than complex tasks that require more skill to orchestrate (Cooper & Sherk, 1989).

It seems logical that teachers' abilities to handle the complex tasks of teaching for higher-level learning are likely to be associated, to varying extents, with each of the variables reviewed above: verbal ability, adaptability, and creativity, subject matter knowledge, understanding of teaching and learning, specific teaching skills, and experience in the classroom, as well as interactions among these variables. In addition, considerations of alignment of the teaching assignment and the teacher's knowledge and experience are likely to influence teachers' effectiveness (Song & Christiansen, 2001), as are conditions that support teachers' individual teaching and the additive effect of teaching across classrooms, such as class sizes and pupil loads, planning time, opportunities to plan and problem solve with colleagues, and curricular supports including appropriate materials and equipment (Darling-Hammond, 2000).

## Quality Teacher Preparation

It makes sense that teacher preparation programs should support individual development in the areas that appear to make a difference in student performance. In the previous section, some student learning effect size was found each of the following categories of teacher characteristics: (1) subject matter knowledge, (2) knowledge of teaching and learning, (3) teaching experience, (4) certification status, and (5) teaching behaviors and practices. But, are traditional teacher preparation programs the place to develop these skills? Moreover, if the answer is yes, how much preparation is enough in each of these categories and what specific processes must be in place to develop further pre-service teachers' abilities in each of these areas?

### **Traditional vs. Alternative Teacher Preparation**

The research support for the positive effects of traditional teacher preparation processes on the quality of teaching seems solid. Greenwald, Hedges, and Laine (1996) found that the change in student achievement for every \$500 of increased spending on teacher education (0.22 test units) was greater than the student learning effect of spending the same amount of money on increasing teacher experience (0.18 test units), increasing teacher salaries (0.16 test units), or lowering pupil/teacher ratios (0.04 test units). Guyton and Farohki (1987) found that knowledge of subject matter and especially the knowledge of teaching and learning acquired in teacher preparation programs are more strongly correlated to student performance than are a broad liberal arts basis skills preparation or specific content area preparation alone. Licensure through teacher preparation programs seems to be a path to success supported by the National Assessment of Educational Progress. In 1994, the proportions of academic

high school teachers teaching with both a license and a major in their field ranged from a low of 52% in Alaska to more than 80% in Iowa, Minnesota, Montana, New Hampshire, North Dakota, and Wisconsin, all states that routinely score near the very top of the distribution on rankings of student achievement in reading and mathematics on the NAEP assessments. This means that while a student in one state might have only a 50/50 chance of being taught by a teacher who is well prepared in his/her field, in another state, nearly all students are guaranteed a fully prepared teacher (Darling-Hammond, 2000).

The research also appears to evidence the positive differences formal teacher preparation programs make in the quality of teachers when compared to alternative preparation methods. Cornett (1984) found the on-the-job performance of teachers who completed regular certification or a formal teacher education program to be better in classroom ratings from superiors when compared to those teachers alternatively trained. Darling-Hammond (2002) found that teachers prepared in a single formal program of preparation feel better prepared than those who take a series of courses from different institutions, who in turn feel better prepared than those who enter through alternative programs that minimize pre-service training and those who enter without prior experience or training. Nweke (2001) found that teacher candidates from NCATE-accredited programs perform better than did students who were denied NCATE accreditation or who were not NCATE accredited. A review of 92 studies on teacher preparation by the Education Commission of the States suggests that research provides little support for the conclusion that alternative-route programs can produce teachers who become as effective as traditionally trained teachers (Allen, 2003). This pattern is

echoed by many other research studies (Ashton & Crocker, 1986; Evertson, Hawley, & Zlotnik, 1985; Haberman, 1984).

The support for traditional preparation programs, however, is not universal. The Abell Foundation Study (2001) found no differences in practices between certified and uncertified teachers. The Teaching Commission (2004) found mixed results, citing inconsistent quality of both traditional and nontraditional teacher preparation processes. The critics argue that other countries, countries that in some categories are outperforming the United States on standardized measures like the TIMMS, do not waste valuable resources developing pedagogical knowledge or instructing pre-service teachers on human behavior and developmental benchmarks (Friedman, 2000). This criticism is more fable than fact. The Asia-Pacific Economic Corporation, for example, a collaboration comprised of twelve Pacific Rim countries including China and Japan, states in its Education Forum that quality teachers are described as having some combination of the following attributes:

- Pedagogical knowledge
- Subject area content knowledge
- The skills and attitudes necessary for effective teaching
- A strong understanding of human growth and child development
- Effective communication skills
- A strong sense of ethics
- A capacity for renewal and ongoing learning

Moreover, the way these traits are developed is through strong preparation programs coupled with intensive field experiences or internships. (APEC, 1995).

## Components of an Effective Teacher Preparation Program

If the case can be made that the performance of a teacher is enhanced by a quality teacher preparation program, what are the appropriate components of such a program? As previously discussed, it appears that some degree of pedagogical and content-specific preparation is necessary (Ashton & Crocker, 1987; Darling-Hammond, 2002; Evertson et. al., 1985; Ferguson & Womack, 1993). Anne Reynolds' (1992) synthesis of research supports the development of a Teaching Tasks Framework that describes the progression of learning that occurs with each individual pre-service teacher. Reynolds contends that development in each of the domains in the framework must occur to position the pre-service teacher for success in the field. Her domains included (1) preparation in general subject/liberal art to develop basic skills in speaking, listening, reading, writing, and calculating; (2) specific content knowledge that develops the knowledge and beliefs about the subject matter they teach; (3) general principles of teaching and learning that addresses issues like generalized instructional techniques, lesson development, classroom management, theories of human growth and development, curriculum planning, and general student evaluation techniques; and (4) content-specific pedagogy that provides an understanding of the knowledge, skills, abilities and interests students bring to the subject, appropriate content-specific instructional strategies, scope and sequence of content, and content-specific evaluation strategies.

Other researchers break out the categories of pre-service teacher development into similar components. Kemp et al. (2002) determined that teacher preparation programs must work to develop and assure minimal competency related to teacher

skills in the areas of subject matter competency, social-cultural competency, instructional competency, and personal/professional competency. French (in Poliakoff, 2002) stated that pre-service teacher graduates must be minimally competent in the areas of subject matter knowledge, pedagogical skills, and the ability to produce learning effects. Ferguson and Womack (1993) developed The Taxonomy of Professional Knowledge and contended that quality teacher preparation programs be measured against their ability to develop pre-service teachers in the following four areas in ascending order of complexity: (1) knowledge of the institution of education, (2) knowledge of the student, (3) knowledge of teaching, and (4) knowledge of clinical applications. Darling-Hammond (2004) found support for a similar set of components that would ensure all preparation programs ensured that teacher have the knowledge and skills they need to teach in a standards-based world, that they be provided structures that develop high-quality teaching and learning strategies, and that they be supported with processes that help them learn how to evaluate students' performance against a given set of standards.

Evertson, Hawley, and Zlotnik (1985) provided a synthesis of research that identified common threads of preparation in quality teacher development programs. These threads include: (1) A strong liberal arts undergraduate education; (2) the development of competence in the subjects to be taught, which would include the equivalent of a major in the primary field for high school teachers; (3) professional education of eight to ten courses, many with a related practicum, to be taken either as an undergraduate or after the baccalaureate is received; (4) a year-long internship in a "teaching school" that would be similar in function and culture to a teaching hospital for



physicians; (5) a one or two-year induction period with special support from the employing school system and a school of education; and (6) continuing professional development related to the learning needs of individuals that is distributed and organized in accord with their specific present and future instructional functions and with leadership roles of the individual. These themes or threads are still relevant today.

#### Methods to Validate Pre-Service Teacher Content Competency

A minimum level of competency related to subject matter knowledge appears to be a necessary foundation for quality instruction in the classroom (Andrews et. al., 1980; Ayers & Qualls, 1979; Monk, 1994). It also appears that ensuring a certain proficiency level of content knowledge is a necessary component of a quality teacher preparation program (Darling-Hammond, 2004; Evertson et al., 1985; French, 2002). However, the appropriate mechanisms to determine adequacy or proficiency of content knowledge continue to be hotly debated (Darling-Hammond, February 2000; Mee, 2000; Weglinsky, 2000). The debate seems to centralize around the question of whether paper-and-pencil content area assessments are the best vehicle to measure adequate content area preparation.

Proponents of assessments like the Praxis II™ and its precursor, the National Teacher Examinations (NTE), cite several positive factors related to the uniform administration of state and national exams like these. These exams provide a consistent measurement of expected content across states, facilitating some degree of comparability of the quality of new teachers in an increasingly mobile society (Educational Testing Service, 1998). These assessments also have forced the education profession generally and teacher preparation programs specifically to

examine “what” content is essential as a minimum expectation for the development of competent teachers (Nelsen & Wood, 1985). These assessments also facilitate gap analyses of individual teacher performance and of teacher preparation program performance in the sense that they measure content supported by state and national content area expectations for students and can be used as a data point to compare to student achievement results (Hyman, 1984). In 1997, the United States Department of Education stated, with regard to teacher testing:

Standardized tests, such as the National Teacher Examinations (NTE), have been used to measure teachers' basic knowledge and skills (e.g., basic literacy, number skills, subject-matter knowledge in particular areas). Teacher test scores have then been linked to student test scores. Ferguson (1990) found that teachers' scores on a test of basic literacy skills were significantly correlated with their students' test scores.

Proponents of additional content-specific testing argue that there are daily examples, in the various media, of less-than-competent teachers, and that additional safeguards should be in place to ensure the public a consistent, minimum expectation for content competency of all teachers (US Department of Education, 2006).

The research on the use of paper-and-pencil exams to determine content competency is mixed. Dybdahl, Shaw, and Edwards (1997) found no correlation between the Preprofessional Skills Test (PPST) and teaching performance. Aksamit and Kleunder (1986) found that the administration of some sort of basic skills assessment did eliminate preservice teachers who lacked appropriate basic skills proficiency. Ballou and Podgursky (1999b) argue that policies should aim to recruit

individual with high levels of general intelligence and academic ability, as measured by content assessments among other measures, while minimizing exposure to knowledge about teaching or extensions of training that they claim would deflect capable people from the profession.

Critics of the use of specific basic skills assessments prior to teacher licensing use two arguments against state or national adoption of policies requiring these types of assessments for all preservice teachers. The first argument is that the assessments themselves provide little value-added to the preparation and licensing process for new teachers. Several researchers (Andrews, Blackmon, & Mackey, 1980; Ayers & Qualls, 1979; Hawk, Coble, & Swanson, 1985; Madaus & O'Dwyer, 1999; Monk, 1994; Quirk, Witten, & Weinberg, 1973) found stronger relationships with teacher performance in course-taking patterns than with subject matter examinations. Other researchers (Ashton & Crocker, 1987; Begle & Geeslin, 1972; Denton & Lacina, 1984; Evertson, Hawley, & Zlotnik, 1985; Ferguson & Womack, 1993; Guyton & Farokhi, 1987) found stronger correlations between knowledge of teaching and learning and teaching effectiveness than were demonstrated between content knowledge and teaching effectiveness.

The second argument is that there are other measures already in place that perform as well or better than the addition of an assessment like the Praxis II™ exam prior to licensure. Several studies (Aksamit, Mitchell, & Pozehl, 1987; Andrews, Blackmon, & Mackey, 1980; Blue et al., 2002; McPhee & Kerr, 2001) found grade point average to be as good or better at predicting future teacher effectiveness. Other researchers (Dobry, 1985; Ferguson & Womack, 1993; McPee & Kerr, 2001; Stoker &

Tarrab, 1984) found that ACT scores were equal to or better measures of basic content knowledge when compared to the PPST and NTEs.

It seems to make sense that state and/or national education policy has an obligation to ensure the public that its teaching workforce is highly qualified and competent. As Iowa worked to ensure compliance with federal expectations on teacher preparation, several questions were considered. Are the current system components in place to prepare teachers in Iowa adequate to ensure subject matter competency, particularly with elementary education teachers? Do the benchmarks that measure teacher performance (e.g., ACT/SAT, grade point average in core courses, Praxis I™/C-Base/CAPE, student teaching evaluations) perform in similar ways to evaluate the content knowledge of prospective teachers? Finally, should Iowa invest in adding another standardized content area test, or is there another mechanism that can assure the public of the quality of Iowa's teachers with less expense and less disruption to the current process? Given the state of conflicting evidence on the performance of assessments like the Praxis II™, Iowa's chosen approach was to develop the IDESTE assessment tool to measure the content knowledge of preservice teachers. It was the belief of the Iowa Department of Education that the IDESTE would be viable as a mechanism to demonstrate to the public and policy makers the quality of content knowledge of Iowa's prospective teachers while requiring only a fraction of the cost of implementing a statewide assessment like the Praxis II™. This study will attempt to examine these issues.

## Summary

As noted earlier, the question of what makes a quality teacher has been debated for many decades. While there continues to be debate on the measurable effect of specific teacher traits, it is clear that some minimal level of content expertise is necessary to be an effective educator. If that content knowledge expertise is necessary, it becomes incumbent on the teacher preparation system to ensure that teachers seeking licensure have the necessary baseline preparation in the areas they will teach. This becomes a particularly interesting debate with elementary school teachers, who typically provide instruction in several content areas.

It also can be assumed that if teacher preparation programs have some role in ensuring adequate content area preparation, there should be a mechanism or mechanisms to “show” laypeople, including state and federal policymakers, that Iowa’s teachers are adequately prepared. The argument central to this study then becomes: “What is the appropriate mechanism by which to demonstrate that Iowa’s preservice teachers are adequately prepared in the content areas they will teach?” Chapter 3 will describe the research design by which that question is examined.

## Chapter 3

### METHODOLOGY

The purpose of this dissertation research was to determine the effectiveness of the pilot IDESTE (Appendix I) in measuring the quality of content area preparation of teacher candidates in the State of Iowa in four core content areas: (1) Reading/Literacy/Language Arts, (2) Mathematics, (3) Science, and (4) Social Studies. In the fall of 2005 and spring of 2006, the cooperating teacher of every student teacher in a teacher preparation program accredited by the Iowa Department of Education completed an IDESTE on each supervised student. This study will establish the validity and reliability of the IDESTE for measuring the quality of content knowledge preparation of these teacher candidates.

This research described the relationships between IDESTE results and other measures of student performance. Under the reauthorized Elementary and Secondary Education Act (ESEA), commonly referred to as No Child Left Behind (NCLB), each state is required to implement a process that ensures teacher candidates have adequate content area preparation. The IDESTE is Iowa's response to that mandate. This research will analyze whether there is a greater amount of efficiency and accuracy in determining student teacher content proficiency through the delivery of the IDESTE than would otherwise be gained by the implementation of another standardized content assessment. The research will correlate the aggregated performance of students on the IDESTE with four other performance measures: (1) ACT/SAT scores, (2) grade point average, (3) Praxis/C-Base/CAAP scores, and (4) Praxis II scores. This chapter presents the research design and methodology that guided the study.

## Research Design

The study will be non-experimental ex post facto; the researcher will not manipulate the variables or conditions from which data are obtained from multiple sources. The researcher will describe conditions that have already occurred. To determine if significant differences exist in student teacher performance on ACT/SAT, grade point average, Praxis I/C-Base/CAPE, and Praxis II, three phases of research and data collection will occur: (1) Completion of the IDESTE by the cooperating teacher of every student teacher in Iowa during the 2005-06 school year, (2) Collection of ACT/SAT, grade point average, and Praxis I™/C-Base/CAPE exam scores on a sample of students from post-secondary institutions, and (3) voluntary submission of Praxis II™ exam scores from student teachers who completed the exam and granted permission for participate in the study.

The researcher collaborated with a team of representatives from the Department of Education and from public and private post-secondary institutions with state-accredited teacher preparation programs to develop the IDESTE assessment tool. The assessment tool was designed to provide each student teacher's cooperating teacher the opportunity to rate the student teacher on each of the State of Iowa's eight teaching standards using a 5-point Likert structure. A rating of 1 indicated "not met" or "unacceptable" performance on that standard. A rating of 2, 3, or 4 indicated a "met" or "acceptable" performance on this standard. A rating of 5 indicated a "met with strength" or "exemplary" performance on the standard. A simple rubric with category descriptors was provided that defined performance measures in each of three major rating categories ("not met," "met," and "met with strength").

Within the evaluation of student teacher performance on Standard 1 of the IDESTE, cooperating teachers were asked to provide content-specific ratings in the areas of (1) reading/literacy/language arts, (2) math, (3) science, and (4) social studies. The initial IDESTE assessment tool was approved by the collaborative group of the Iowa Department of Education, post-secondary teacher preparation program representatives, and the United States Department of Education. Approval was sought and obtained from the Human Subjects Research office, Iowa State University, for data collection on the IDESTE results and the collection of ACT/SAT, grade point average, Praxis I™/C-Base/CAPE exam and Praxis II™ data from select 2005-06 student teachers (Appendix J).

#### *Data Collection*

A cover letter (Appendix G) was prepared for each cooperating teacher of each student teacher, explaining the purpose, importance, and proper implementation of the IDESTE for each student teacher. The letter asked cooperating teachers to complete the enclosed assessment tool and return it to a designated contact at the post-secondary institution. This letter was emailed to each post-secondary institution and forwarded to each cooperating teacher. The completed IDESTE assessment tools were sent to a designated person in each teacher preparation program who then forwarded the completed assessment tools to the Department of Education.

A cover letter (Appendix C), study description, permission forms (Appendix K), and Praxis II™ score reporting form (Appendix D) were sent to all elementary-level pre-teacher candidate seeking an elementary education endorsement who completed student teaching during the 2005-06 school year. This packet invited them to submit



Praxis II scores, if applicable, for that portion of the study. The packet of information included a self-addressed, stamped envelope to return the permission forms and Praxis II™ results. Participants were informed that any collected data would be kept in confidence by the researcher and shared only in the aggregate in the following data analysis. A follow-up reminder letter was used as well (Appendix M).

### *Data Analysis*

Four distinct categories of analysis were performed on the data collected from the identified sources:

1. The results from the IDESTE assessment tools were analyzed for consistency of scores in the content subject areas within Standard 2 of the Iowa Teaching Standards. The ratings for the items were summed and these summed scores for each content area were correlated. In addition, t-tests of summed scores were conducted and these transformed scores were compared. This type of analysis provided additional comparisons with a control for unequal variance in the content area category distributions.
2. For the IDESTE results, Cronbach alpha reliability analysis and maximum likelihood extraction factor analysis were conducted to establish the internal consistency and construct validity of the scale and for the results in each content area category.
3. For a sample of up to 300 students, the Department of Education, in collaboration with the researcher, obtained SAT/ACT scores, grade point averages, and Praxis I™/C-Base/CAPE exam scores for each sampled

- student. T-tests of summed scores were conducted on each of these measures, which were correlated with the IDESTE content area categories.
4. Anticipating that the distributions of scores on the IDESTE and other measures would be skewed, the researcher used accepted procedures and interpretations to address those issues as they arose.

Quantitative data were examined, compared, and interpreted using the above methods. Statistical analyses were performed using SAS, version 9.1. The internal consistency (reliability) of the IDESTE categories was assessed using Cronbach's coefficient alpha, and Spearman's correlations were used to depict relationships between the various data sets. One-way analysis of variance (ANOVA) and t-tests were used to determine differences among stakeholder groups by demographic characteristics, between post-secondary institutions performance, and between the t-test performance of the sample on the various categories of measurements. Statistical significance was based on a Type I error probability of less than 0.05.

#### Null Hypotheses

1. The IDESTE is a valid and reliable assessment.
2. When comparing statewide student performance averages in IDESTE content areas, there are no relationships between the performances in the four content areas measured by the IDESTE of student teachers seeking elementary education endorsements.
3. When comparing student performance in each college program, there are no relationships between the performances in the four content areas measured by the IDESTE of student teachers seeking elementary education endorsements.

4. When comparing the performance of students in each content area within each college program to the statewide average in each content area, there are no significant performance differences.

5. The performance of students in content areas as documented by the IDESTE is similar to the performance of these students as documented by the ACT (including subtests), overall grade point average, and teacher preparation program pre-admissions content tests like the Praxis I and C-Base (including subtests).

#### Sample Selection

All cooperating teachers of any pre-service teacher participating in student teaching during the 2005-06 school year were required by the Iowa Department of Education to complete an IDESTE assessment tool on that student teacher. From this sampling pool, 300 students were randomly selected. The Department of Education requested ACT/SAT scores and subscores, grade point averages, and Praxis I/C-Base/CAPE exam scores and subscores from those students' post-secondary institution. All 2005-06 student teachers seeking elementary teaching endorsements were invited to submit Praxis II scores if they took the assessment.

#### Limitations of the Participant Sample

The pool of candidates for participation in this study was not random; the researcher used the pool of teacher candidates available during the 2005-06 school year. The pool included in the Praxis II portion of the study was limited to those students who volunteered information regarding the Praxis II™ exam results.

## Human Subjects Procedures

Approval was obtained from the Human Subjects Research Office, Iowa State University, to compile the data from participants (Appendices J and K). Each participant in the Praxis II portion of the study was invited to participate and to sign an informed content/release form.

### Summary

This chapter described the methods and procedures that were used to obtain the data used for the study and to analyze the data in relation to the research questions. Included in the section was a discussion of sample selection, limitations of the participant sample, human studies procedures, and data management and analysis. The null hypotheses were described and the design and methods for the data analysis were included.

## Chapter 4

### ANALYSIS OF THE DATA

The purpose of this dissertation research was to determine whether the implementation of the IDESTE was a valid and reliable mechanism to measure the adequacy of elementary preservice teachers' content knowledge. The federal ESEA (NCLB) requires states to implement procedures to ensure that every teacher in the state is "highly qualified" upon graduation from a state accredited teacher preparation program. Iowa's interest in the IDESTE is both a matter of support for best practice and fiscal responsibility. Iowa would like to avoid a long-term commitment to implementation of the Praxis II™, a paper and pencil content knowledge assessment, or a similar assessment for two reasons. First, there is a belief that the Iowa system as currently structured contains adequate information on the quality of content preparation for preservice teachers. Second, the Praxis II™ or other similar assessment comes at an expense to those who must take the exam and the data obtained from this assessment may be duplicative of data already in the system. IDESTE's potential value lies in the measurement of content knowledge that may not be currently assessed in a reliable and valid way by any of the other measures currently in the system and in its low cost to the system.

As stated in Chapter 3, a team representing the Department of Education, the K-12 system, and the post-secondary teacher preparation system developed the IDESTE. The IDESTE was administered to every 2005-06 student teacher in each Iowa-accredited teacher preparation program. Every completed IDESTE was forwarded through the teacher preparation program to the Iowa Department of Education for

compilation and analysis. This study focused on the adequacy of content preparation of prospective elementary school teachers, as high school and most middle school teachers take a more-defined set of content area courses that typically meet federal highly qualified teacher as well as state licensing criteria. The total sample of 2005-06 student teachers seeking elementary-level endorsements included in this study was 1,158. Additional data were collected from a random subsample of students within this group of 1,158 elementary preservice teachers. This subsample was used to compare IDESTE performance to other existing measurements of content knowledge including ACT (including subtests), overall grade point average, Praxis I™ reading, math, and writing scores, and C-BASE reading, math, and writing scores.

Two major categories of analysis were completed using the data provided. The first category of analysis occurred within the IDESTE data itself. Were the data found to be reliable and valid? Were there differences in the way students performed within the four IDESTE content subcategories when looking statewide and looking within certain college programs? Did select college performance vary significantly from statewide performance? The second major category of analysis compared the IDESTE performance to other measures of content knowledge already in the system, such as ACT scores (composite and subtests), overall grade point average, Praxis I™ scores, and C-Base scores. These general questions led to the development of specific null hypotheses, which are described in Chapter 3. These null hypotheses formed the basis for the quantitative analyses of IDESTE and other data described in the remainder of this chapter.

## The Overall Sample

As the Department of Education required the administration of the IDESTE assessment with all 2005-06 student teachers, there was a 100% participation rate with the targeted population. In cases where more than one IDESTE was completed for a given student, the results for this student were prorated by the time spent in each setting with each cooperating teacher and averaged to give one result for each student teacher. 1,158 of 1,570 final IDESTE tools were analyzed in this study from 29 state-approved teacher preparation programs. Table 1 shows the number of 2005-06 elementary-level student teachers from each program included in this study. The numbers in this table may not match the number provided by each program, as some data were excluded because the data were incomplete.

Table 1

*Numbers of elementary-level student teachers from each program included in this study*

Program	Students	Program	Students	Program	Students
Northern Iowa	255	Mt. Mercy	26	Briar Cliff	13
Iowa	140	Wartburg	26	Coe	13
Buena Vista	112	Grand View	24	Faith Baptist	13
Iowa State	89	Loras	24	Dubuque	12
Upper Iowa	64	Luther	23	Clarke	11
Graceland	54	Northwestern	22	Simpson	10
Iowa Wesleyan	48	Ashford	18	Cornell	7
Dordt	35	Drake	17	Waldorf	6
St. Ambrose	32	Morningside	16	Emmaus	3
Central	30	William Penn	15		

### Description of the ACT/GPA/Praxis I™/C-Base subsample

To compare the IDESTE results with other existing measures of student content knowledge, a random subsample was identified within the overall sample that contained students from every state-accredited teacher preparation program. It was the belief of the Department of Education that collecting ACT, grade point average, and Praxis I™/C-Base information from each teacher preparation program for all 1,158 student teachers in the overall sample would be an excessive data burden if, in fact, a representative subsample could be identified.

To address whether the subsample was representative of the overall sample, t-tests were performed comparing the means of the subsample with the means from the overall sample. Table 2 shows the results of these t-tests:

Table 2

*T-test results comparing Overall IDESTE sample means to IDESTE subsample means*

Content Area	Mean Overall	Mean Subsample	T value	Pr>/t/
Composite	4.421	4.507	-1.5175	0.1995
Lang Arts/Eng	4.446	4.445	-1.13	0.2613
Math	4.386	4.445	-2.21	0.0281
Science	4.355	4.333	-0.74	0.4607
Soc. Studies	4.337	4.389	-1.99	0.0479

Pr>/t/ = 0.05 level of significance

The results show that the null assumption that the subsample is representative of the overall sample is generally supported. The results failed to reject the null for the overall composite average and in two of the content areas, language arts, and science.



Two of the other categories, math and social studies, rejected the null, one by a small margin and one by a larger margin. It generally can be assumed that the subsample represents the larger sample, although care should be taken to overinterpret results in the two content areas in which the null was rejected.

## Findings

### *Descriptive Statistics – IDESTE*

Category 2 of the IDESTE instrument asked cooperating teachers to evaluate the quality of the content knowledge of the student teacher in four categories: Language Art/English/Literacy, Mathematics, Science, and Social Studies. The cooperating teacher provided a ranking of the student teacher on a five-point Likert-type range.

Table 3 provides the simple statistics on the total sample of 1,158 preservice teachers included in the entire IDESTE sample:

Table 3

### *IDESTE simple statistics on total IDESTE sample*

Content Area	N	Mean	Standard Deviation	Minimum	Maximum	Median
Lang. Arts	1,158	4.51813	0.71357	2	5	5
Math	1,158	4.46805	0.72271	1	5	5
Science	1,158	4.40933	0.74721	2	5	5
Soc. Stud.	1,158	4.39206	0.77783	2	5	5
Composite	1,158	4.44608	0.58610	2.25	5	5

Additionally, Table 4 presents the simple statistics for the IDESTE results for each of the 29 approved teacher preparation programs:

Table 4

### *IDESTE simple statistics – by program*

College Program	N	LA Mean	Std. Dev.	Math Mean	Std. Dev.	Sci. Mean	Std. Dev.	Soc.St. Mean	Std. Dev.
Ashford	18	4.611	0.608	4.5	0.618	4.278	0.752	4.5	0.707
Briar Cliff	13	4.692	0.630	4.385	0.768	4.385	0.768	4.538	0.660
Buena Vista	112	4.446	0.757	4.464	0.734	4.321	0.830	4.339	0.778
Central	30	4.4	0.621	4.367	0.669	4.3	0.651	4.267	0.691
Clarke	11	4.636	0.674	4.545	0.688	4.455	0.820	4.455	0.820
Coe	13	4.462	0.776	4.538	0.776	4.462	0.660	4.308	0.855
Cornell	7	3.143	0.900	3.143	0.900	3.714	0.951	3.286	0.951
Dordt	35	4.543	0.701	4.4	0.736	4.486	0.702	4.4	0.775
Drake	17	4.471	0.943	3.941	1.249	4.0	0.791	4.0	0.935
Dubuque	12	4.5	0.798	4.5	0.798	4.583	0.793	4.75	0.622
Emmaus	3	4.333	1.155	4.333	1.155	4.667	0.577	4.0	1.732
Faith Baptist	13	4.231	0.832	4.308	0.751	4.077	0.760	4.154	1.068
Graceland	54	4.278	0.878	4.148	0.856	4.148	0.920	4.037	0.910
Grandview	24	4.792	0.509	4.708	0.550	4.75	0.442	4.708	0.550
IA Wesleyan	48	4.583	0.647	4.583	0.651	4.417	0.739	4.458	0.743
Iowa	140	4.557	0.792	4.436	0.702	4.386	0.705	4.464	0.693
Iowa State	89	4.539	0.755	4.674	0.539	4.551	0.739	4.494	0.771
Loras	24	4.042	0.955	4.0	0.978	3.792	1.102	3.75	1.113
Luther	23	4.522	0.665	4.522	0.790	4.391	0.783	4.438	0.843
Morningside	16	4.313	1.015	4.375	0.806	4.438	0.629	4.125	0.957
Mt. Mercy	26	4.654	0.629	4.461	0.811	4.423	0.703	4.385	0.804
Northern Iowa	255	4.561	0.666	4.565	0.538	4.478	0.692	4.451	0.724
Northwestern	22	4.455	0.739	4.545	0.671	4.364	0.790	4.273	0.827
Simpson	10	4.6	0.516	4.3	0.823	4.6	0.516	4.6	0.516
St. Ambrose	32	4.938	0.246	4.781	0.553	4.594	0.712	4.656	0.545
Upper Iowa	64	4.5	0.617	4.469	0.690	4.5	0.690	4.422	0.813
Waldorf	6	4.167	0.408	4.333	0.817	4.167	0.408	4.167	0.408
Wartburg	26	4.615	0.496	4.385	0.637	4.538	0.582	4.423	0.578
William Penn	15	4.867	0.352	4.667	0.488	4.667	0.617	4.667	0.488
Total	1,158	4.518	0.714	4.468	0.723	4.409	0.737	4.392	0.763

The distribution of IDESTE scores is heavily skewed to the “5” end of the scale. In fact, the percentage of 5s given to student teachers overall ranged from 55.4% in science to 62.2% in English/Language Arts. Figures showing distributions of IDESTE data, as well as ACT, grade point average, Praxis I™, and C-Base data, are included in Appendix B.

### Descriptive Statistics – Other measures

Additional data were collected for the randomly sampled subgroup of student teachers. Table 5 displays the simple statistics on each of the collected measures:

Table 5

Descriptive statistics for ACT, grade point average, Praxis I™ and C-Base data

Measure	N	Mean	Standard Deviation	Minimum	Maximum
ACT Composite	181	22.404	3.330	15	31
ACT Lang. Arts	181	22.533	4.400	12	35
ACT Math	181	21.885	3.984	12	34
ACT Reading	181	22.719	4.671	11	36
ACT Science	181	21.950	3.372	14	31
Grade Point Average	181	3.471	0.334	2.300	4.00
Praxis I™ Composite	125	178.890	3.160	168	186.33
Praxis I™ Reading	125	179.230	3.792	165	187
Praxis I™ Math	125	180.011	5.034	166	190
Praxis I™ Writing	125	176.326	3.034	167	186
C-Base Composite	56	867.51	79.862	731	1073
C-Base Reading	56	286.18	44.086	193	373
C-Base Math	56	292.38	46.261	207	402
C-Base Writing	56	288.46	30.327	227	383

Null Hypothesis 1: The IDESTE is a valid and reliable assessment.

### *Reliability*

Reliability has to do with the quality of the measure. To assess the reliability of this measure, internal consistency was measured using Cronbach's alpha. The standardized Cronbach's alpha value for the total instrument was 0.888. This result indicates a high level of internal consistency among the IDESTE items and supports the conceptualization of the instrument as measuring a single underlying concept or construct. This result is maintained using a standardized Cronbach's alpha with deleted variables. Table 6 displays the Cronbach alpha by content area

Table 6

#### *Standardized Cronbach Alpha by content area*

Content Area	Correlation with total	Alpha value
Overall		0.888
LA/English	0.753	0.858
Math	0.738	0.864
Science	0.760	0.856
Soc. Studies	0.722	0.851

An alpha value of 0.75 or higher is a generally accepted as an adequate level of reliability in the results (Yu, 2006). It appears that the IDESTE is a reliable method of assessment.

### *Validity*

Construct validity refers to the degree to which inferences can legitimately be made from the results of a given study to the theoretical constructs on which the study

was based. Like external validity, construct validity is related to generalizing a result to a broader concept, but where external validity involves generalizing from the study context to other people, places, or times, construct validity involves generalizing from a set of measures to the concept behind the measures. To address the degree of construct validity and a sense of whether the assessment measures the primary construct behind the assessment (content knowledge) or if there are other factors contributing to the outcome, a maximum likelihood estimation factor analysis was conducted.

This type of analysis predicts, in a very conservative way, the likelihood that the assessment is measuring a single construct or whether more constructs are influencing the data results. The Eigen values of the weighted reduced correlation matrix are listed in Table 7:

Table 7

*Maximum Likelihood Extraction Factor Analysis – Eigenvalues*

Factors	Eigenvalue
1	8.0986
2	0.1483
3	0.00189
4	-0.15014

In a typical factor analysis, researchers look for the number of factors above and below a +1.0 result. An Eigen value above a +1.0 indicates the number of constructs influencing the outcome (Darlington, 2006). In this analysis, SAS determined that only one factor was necessary to support the underlying construct. However, the number of

factors possible was only four, limiting the ability of the program to have a result indicating multiple factors. While these eigen values are a positive support for the construct validity, the addition of both scale points and subcontent categories would increase the sensitivity of the factor analysis and lead to a more definitive determination of the number of constructs in play.

The assessment tool asked cooperating teachers to indicate the degree to which they believed the student teacher had mastery of the content in the identified area. Face validity seems to support the measurement aligning to the desired outcome. The factor analysis above indicates that there is one primary construct behind the results presented by the data. While it is possible that a completely different construct is being measured by the assessment, one other than content adequacy, this result is unlikely. The results of this assessment would seem to indicate that the measure does assess the construct defined as “adequate content knowledge.”

Later in this section, concurrent validity will be addressed as well. Concurrent validity describes, in this situation, the degree to which the IDESTE performs like other valid and reliable measures of content knowledge. Null hypothesis five goes into more depth comparing IDESTE to ACT scores, grade point average, and other content area assessments like the Praxis I™ and C-Base exams.

Null Hypothesis 2: There are no significant relationships in the statewide performances of student teachers seeking elementary education endorsements in the four content areas measured by the IDESTE.

The null hypothesis assumes no relationship of student teacher performance in one content area to student teacher performance in any other content area, namely that there is a zero correlation between these content areas at the state level. To gauge the degree to which this null hypothesis was true, the overall sample of IDESTE results was used. State means were computed in each content area.

The first analysis of relationship between the content areas was using Spearman's Rho. Spearman's rho is preferred over Pearson's r when the measurements used are ordinal. The Spearman coefficient is a distribution-free test, in that it makes no assumptions concerning the shape of the distribution from which the sample data were drawn. This is particularly useful when the distribution is markedly skewed, as is this IDESTE sample.

Table 8 shows the Spearman's rho values and the probability coefficients for each content area compared to every other content area:

Table 8

*Spearman Rho values – content areas*

	LA		Math		Science		Soc Stud.	
LA	1.000		0.683	<0.0001	0.628	<0.0001	0.638	<0.0001
Math	0.683	<0.0001	1.000		0.638	<0.0001	0.639	<0.0001
Science	0.628	<0.0001	0.638	<0.0001	1.000		0.715	<0.0001
Soc Stud.	0.638	<0.0001	0.639	<0.0001	0.715	<0.0001	1.000	

The null is rejected in every case, indicating a solid relationship between student teacher performances in one content area with performance in all other content areas.

This is not an unlikely finding, given that most of these student teachers were evaluated in all content areas by the same cooperating teacher and that performance ratings tended to be consistently high or low, but generally not varied among content areas for a given student.

A second analysis of the data was conducted using a repeated measures ANOVA to test for within-subject-area effects. Again, the basic assumption is that no relationship exists between the performances of student teachers' in the four content areas measured by IDESTE. This analysis produced an  $F$ -value of 20.94 with  $p < 0.0001$ . The eta-squared value for this ANOVA was 0.73. These results reinforce the notion that there is a strong relationship between performances in one content area and performance in all other content areas and lead to rejection of the null hypothesis of no relationship.

Null Hypothesis 3: Within each program, there are no relationships between the performances in the four content areas measured by the IDESTE of student teachers seeking elementary education endorsements.

Appendix A contains similar Spearman's rho analyses for each college program. With 29 programs, 174 total Spearman's Rho coefficients were calculated, 6 per program (4 content areas compared to each other). The large majority of these comparisons rejected the null hypothesis that there was no relationship, showing that performance in one content area within a program was related to performance in another content area. Twenty-four separate Spearman rho correlations failed to reject



the null hypothesis and at first glance indicated differences in performance between content areas within a given program.

However, the largest program with any correlation that failed to reject the null was a program with only 24 students. Most of the programs had less than 15 students, many with the total number of students in single digits. The results of any of these comparisons are suspect due to the small sample size in a given program. It should not be assumed that these differences are real, as there is a strong likelihood that the variability of the small sample size contributed greatly to this outcome. Future assessment of these programs should be conducted to determine whether this is, in fact, a real effect or simply a statistical anomaly. Using a Bonferroni adjustment for multiple comparisons would indicate that one would expect 9 results ( $0.5 \times 174$ , then rounded) that would not reject the null by chance, so the result of 24 results failing to reject the mean is not as aberrant as it initially appears.

Conducting the repeated measures ANOVA with GLM procedures for within-subject-area effects on the overall statewide data answers the question for the individual program level as well. Because the repeated measures ANOVA already includes multiple comparisons of all data included in the sample, separating out a specific college data set to run another repeated measures ANOVA would be duplicative of the original analysis and redundant to the outcome. There may be small colleges where the performance across content areas is different, but these differences would not be statistically significant given the small sample size.

Null Hypothesis 4: When comparing the performance of students in each content area within each college program to the statewide average in each content area, there are no significant performance differences.

To compare individual college performances to statewide performance, a series of t-tests were completed. Because many of the college programs had a very small number of student teachers and there were concerns about the variability of very small sample sizes, only the seven largest programs were used (see Table 1) for this comparison. The assumption made with each t-test was that the difference in performance between the program mean and the statewide mean was not significant.

The results of these t-tests are described in Table 9:

Table 9

*Content area t-test comparisons of program performance to statewide performance*

Program	LA T- value	Pr>/t/	Math T- value	Pr>/t/	Science T-value	Pr>/t/	Soc. Stud. T- value	Pr>/t/
UNI	0.16	0.871	1.52	0.130	1.50	0.135	1.48	0.141
Iowa	1.55	0.123	-0.33	0.742	-0.31	0.756	0.88	0.380
Buena Vista	-1.01	0.314	-0.39	0.695	-0.96	0.337	-0.71	0.480
Iowa State	0.41	0.679	3.18	0.0019	2.05	0.0427	1.66	0.0995
Upper Iowa	0.88	0.383	0.36	0.722	0.30	0.768	-.042	0.675
Graceland	-2.68	0.0095	-2.07	0.043	-2.11	0.0396	-3.07	0.0033
Iowa Wesleyan	0.38	0.709	-0.53	0.598	-0.16	0.873	0.82	0.414
State Mean	4.446		4.386		4.355		4.337	

If the  $p$ -value is 0.05 or less, the result is meaningful enough to reject the null hypothesis and to say that the difference between the program result and statewide performance is significant. The majority of these results show that there are no significant differences between the performance of the program and the statewide average in a given content area. Shading in the table indicates those results that were significant, meaning that the performance of this program in the given content area did differ significantly from the statewide average. Caution should be taken to avoid over-analysis of these data, as this was a one-time snapshot of performance for each of these programs. To examine fully the program performance would require a performance trend line, something not yet possible with IDESTE results.

Null Hypothesis 5: The performance of students in content areas as documented by the IDESTE is similar to the performance of these students as documented by the ACT (including subtests), overall grade point average, and teacher preparation program pre-admissions content tests like the Praxis I™ and C-Base (including subtests).

To complete the analysis related to this hypothesis and to estimate the concurrent validity of the IDESTE, a series of Pearson correlations were computed. Ten categories of comparison were generated by this analysis:

1. IDESTE results compared to a) GPA, b) ACT, c) Praxis I™, and d) C-Base results;
2. GPA compared to a) ACT, b) Praxis I™, and c) C-Base results; and
3. ACT compared to a) Praxis I™ and b) C-Base results.

It should be noted that Praxis I scores could not be correlated with C-Base scores since no students took both assessments.

*IDESTE data correlated with ACT, GPA, Praxis I™, and C-Base data*

Table 10 shows various comparisons of IDESTE composite and content area data with other measures:

Table 10

*IDESTE correlations with various data from other measures*

Comparison	Pearson's r	Prob>/r/
IDESTE Composite with grade point average	0.238	0.0013
IDESTE Composite with Praxis I™ Composite	0.113	0.213
IDESTE Language Arts with Praxis I™ Reading	0.014	0.849
IDESTE Language Arts with Praxis I™ Writing	0.059	0.437
IDESTE Math with Praxis I™ Math	0.116	0.123
IDESTE Composite with ACT Composite	0.207	0.023
IDESTE Language Arts with ACT Composite	0.172	0.025
IDESTE Math with ACT Composite	0.032	0.678
IDESTE Science with ACT Composite	0.146	0.085
IDESTE Social Studies with ACT Composite	0.155	0.065
IDESTE Language Arts with ACT Language Arts	0.204	0.008
IDESTE Language Arts with ACT Reading	0.130	0.095
IDESTE Math with ACT Math	0.094	0.232
IDESTE Science with ACT Science	0.081	0.341
IDESTE Social Studies with ACT Reading	0.155	0.068

Comparison	Pearson's r	Prob>/r/
IDESTE Composite with C-Base Composite	0.033	0.833
IDESTE Language Arts with C-Base Reading	0.161	0.327
IDESTE Math with C-Base Math	0.032	0.817
IDESTE Language Arts with C-Base Writing	0.113	0.409

The majority of these correlations show little to no relationship between the IDESTE and other measures. The strongest correlation in this set of comparisons, and that particular correlation is weak to moderate at best, is between the IDESTE composite and grade point average. Further analysis of other relationship is necessary to put these data in proper context, but one possible conclusion to be drawn from this analysis, assuming the IDESTE has adequate reliability and construct validity, is that the IDESTE assesses different information than is assessed by the other measures.

Because the majority of these null hypotheses assuming no relationship were not rejected, it is safe to assume there is little relationship between the measures. This result simply reflects that the null hypothesis measures are assessing different content and knowledge.

It also should be noted, however, that these various measures use different scales. Given the lack of variability in the distribution of the IDESTE scores, the correlations likely are suppressed due to the lack of sensitivity of the IDESTE, meaning that the actual relationships between the measures could be higher than indicated in this study. Possible adjustments to the IDESTE to correct for this potential problem are discussed in Chapter 5.

*Grade point average data correlated with ACT, Praxis I™, and C-Based data*

Table 11 shows comparisons of grade point average data with other measures:

Table 11

*Grade Point Average Pearson correlations with various data from other measures*

Comparison	Pearson's r	Prob>/r/
Grade Point Average with ACT Composite	0.405	<0.0001
Grade Point Average with Praxis I™ Composite	0.332	<0.001
Grade Point Average with C-Base Composite	0.265	0.049

These correlations show moderate to strong relationships between grade point average and other measures of content knowledge. Each null hypothesis assuming no relationship is rejected, showing some degree of alignment between these measures. Given the assumption that grade point average reflects coursework that is broader than measured by norm-referenced standardized assessments, it seems to make sense that relationships would be moderate at best. A strong correlation in this case would mean that the entire scope and sequence of coursework that combines to form the grade point average would be covered by these paper and pencil tests, something we know does not occur.

*ACT composite and subscore data correlated with Praxis I™ and C-Base data*

Table 12 shows comparisons of ACT composite and subscore data with Praxis I™ and C-Base data:

Table 12

*ACT composite and subscore Pearson correlations with Praxis I™ and C-Base data*

Comparison	Pearson's r	Prob>/r/
ACT Composite with Praxis I™ Composite	0.792	<0.0001
ACT Reading with Praxis I™ Reading	0.597	<0.0001
ACT Language Arts with Praxis I™ Reading	0.538	<0.0001
ACT Math with Praxis I™ Math	0.736	<0.0001
ACT Language Arts with Praxis I™ Writing	0.661	<0.0001
ACT Composite with C-Base Composite	0.653	0.0004
ACT Language Arts with C-Base Reading	0.591	0.0019
ACT Reading with C-Base Reading	0.766	<0.0001
ACT Language Arts with C-Base Writing	0.620	0.0009
ACT Math with C-Base Math	0.649	0.0004

These correlations are strong and each null hypothesis of no relationship is rejected. These assessments measure a defined set of content knowledge and the correlations would indicate that there is considerable overlap in the measured content among all of these assessments.

It appears that the IDESTE has weak to moderate concurrent validity with the other measures included in this study, which in and of itself is not a fatal finding for the IDESTE. The lack of strong correlations with other measures does imply that either (1) the IDESTE measures content other than that assessed by any of the other measures or (2) the IDESTE has no value added to this system. The second conclusion, however, flies in the face of the reliability and validity data found earlier in the section.

## Summary

The IDESTE was found to have an adequate level of reliability and construct validity. Differences between statewide performances in each content area were not significant. Most individual programs performed in a similar way to the statewide averages. Weak to moderate relationship exists between the IDESTE and grade point average, ACT scores, Praxis I™ scores, or C-Base scores. Stronger relationships existed between the paper and pencil tests than between these tests and other measures. Longitudinal data on the IDESTE would be necessary for further comparisons and analysis.



## Chapter 5

### SUMMARY, DISCUSSION, IMPLICATIONS, AND CONCLUSIONS

#### Summary of the Study

This dissertation research was a pilot of the IDESTE and intended to determine initial reliability and validity results while allowing for comparison of IDESTE performance against other common measures of content knowledge. A Task Force that included representatives from the Department of Education, the K-12 school system, and post-secondary teacher preparation programs developed the IDESTE. The IDESTE contained questions related to each of the eight Iowa teaching standards, and this study focused on the performance of student teachers related to question (standard) 2, adequacy of content knowledge. The study further focused this analysis on student teachers seeking elementary-level endorsements from the State of Iowa. The federal Elementary and Secondary Education Act (commonly referred to as No Child Left Behind) contains provisions for states to ensure that every teacher in the classroom is “highly qualified.” This is a unique dilemma for states regarding elementary level teachers, as they typically need a broad preparation in many content areas, a different scenario than most middle and high school teachers, who generally specialize in only a few content areas or just a single content area.

To complete this study, the Department of Education collected IDESTE results for 1,570 student teachers during the 2005-06 school year that were also seeking elementary-level endorsements. Chapter 4 details the various ways these data were analyzed to determine validity and reliability. Additionally, a random subsample of 300 students within the IDESTE sample was selected and additional data were collected on

the students in this subsample in an attempt to compare the performance of the IDESTE to other common measures of content knowledge. Subsample data collected included ACT scores (composite and subtests), grade point average, Praxis I™ scores (composite and subtests), C-Base scores (composite and subtests), and CAAP scores (composite and subtests). Because so few students took the CAAP statewide, this subset of data was not used.

The goals of the study were to address five distinct questions:

- (1) Is the IDESTE a valid and reliable assessment mechanism?
- (2) Are there significant differences between the statewide performances of student teachers on the IDESTE when comparing different content areas?
- (3) Are there significant differences between the performances of student teachers within each program on the IDESTE when comparing different content areas?
- (4) Does the performance of students in each program differ significantly from the statewide average in each content area?
- (5) Do the IDESTE results compare in a similar way to results from other measures of content knowledge currently in the system?

The data developed for this study should help the State of Iowa and the Iowa Department of Education make informed policy decisions related to the continuation of the implementation of IDESTE and the process of assuring the U.S. Department of Education that all teachers in the State of Iowa meet federal highly qualified teacher definitions.

## Discussion of the Study Findings

### *Evaluation of the IDESTE*

The IDESTE was the instrument of choice during 2005-06 for the Department of Education, as it worked to convince the U.S. Department of Education that every student teacher in Iowa was highly qualified. Of the 1,570 student teachers seeking elementary-level endorsements that were included in the IDESTE sample, 1,158 viable results were obtained. Some data were excluded due to problems with form completion or missing data. Tables 3 and 4 display simple statistics related to the complete IDESTE data set and Appendix B shows score distributions.

From the sample of 1,158 viable IDESTE results, a random subsample of 300 students was identified for further data collection and analysis. Twenty-nine of the 31 state-approved programs were represented in the subsample. The programs were asked to supply additional ACT, GPA, and Praxis I™/C-Base/CAAP data on each of these students. Of the 300 included in the subsample, 181 viable results were obtained. Again, some student results were disregarded because the program failed to produce or could not produce a complete data set. Table 5 displays the simple statistics related to the data collected on the random subsample within the IDESTE data set and Appendix B shows score distributions.

To assure readers that the subsample was representative of the overall sample, t-tests were completed comparing the IDESTE composite and content area means with the same means of the random subsample. Table 2 describes the results of those t-tests. The majority of the t-tests showed that there was a relationship between the performance of the overall sample and the performance of the subsample.

To determine the reliability of the IDESTE instrument, a Cronbach's alpha assessment of reliability and a maximum likelihood extraction factor analysis were conducted. Table 6 shows the results of Cronbach's alpha. Researchers (Darlington, 2006; Wu, 200) indicate that an alpha value of 0.75 or greater is an indicator of solid reliability. All of the values on the IDESTE were 0.851 or higher.

This study also assessed the face, construct, and concurrent validity of the IDESTE. Face validity is more of a judgment than an actual analysis. Simply put, do the questions in the instrument appear to align to the basic construct to be measured? In other words, if the Iowa Department of Education wants an assessment of the adequacy of content knowledge as perceived by the cooperating teacher and assessed using the IDESTE, does the question in the IDESTE support that basic construct? At face value, the answer appears to be "yes."

Further analysis of construct validity was conducted using a maximum likelihood extraction factor analysis. The results from that factor analysis (Table 7) appear to support the conclusion that the IDESTE measures one primary underlying construct. This finding, coupled with an estimation of face validity, leads to the conclusion that the IDESTE has solid construct validity. Concurrent validity is a concept determined by triangulation of the relationships between the IDESTE and other content measures. This will be discussed in more detail in the next section.

### *Study Findings*

Student teacher performance in all content categories of the IDESTE would seem to indicate that cooperating teachers generally believe elementary-level student teachers in Iowa have adequate content area preparation and knowledge. The means

for statewide results (Table 3) and program results (Table 4) show that the large majority of scores fell into the “4” and “5” categories. In fact, very few “1” ratings were given. A rating of “1” indicated that the cooperating teacher felt that the student teacher was not adequately prepared in that content area. While the assessment instrument only used a range of 1 to 5 and, as a result, lacked the greater sensitivity that could be provided by measurements spanning a wider range of possible values, it is also clear that expansion of the range or the addition of subcategories within each content category likely would not make a difference in the overall determination of content adequacy given the very small number of students given “1s” in any category. Expansion of the range of measures or the addition of content subcategories likely would improve the sensitivity of the IDESTE measure and its relationships with other measures because of the effect of spreading out the IDESTE sample and increased variability of the IDESTE data. This, of course, assumes that spreading the scale of the assessment would mean fewer students would be given the top rating. That assumption should be tested in future studies on different variations of the IDESTE.

Additionally, there are at least two possible explanations for the heavily skewed distribution of scores. The first is that the Iowa system, as developed, is performing its function correctly. In other words, by the time prospective teachers are ready for student teaching, the other checks and balances in the system have sorted out those students without adequate content knowledge, leaving only students with adequate preparation. A second explanation could be that the assessment provided by the cooperating teacher on the IDESTE has little to do with actual content knowledge of the student teacher and more to do with the quality of the relationship between the student teacher

and the cooperating teacher. However, this flies in the face of some of the correlational, reliability, and validity results reported in this study. This topic will be discussed further in the recommendations section.

For the most part, individual program performance mirrored statewide performance on the IDESTE. The programs that were found to have results significantly different from the statewide averages were also the smallest programs; their small sample sizes negate any ability to draw firm conclusions based on the results for these small programs.

It also should be noted that the skewed distribution of IDESTE results had an impact on determining the relationship between the IDESTE and other measures. Because the range of scores of the IDESTE was different (smaller) than the range of scores of the other measures, and because the results of the IDESTE were heavily skewed (non-normal distribution), the reduced variability in the IDESTE sample results suppressed the degree to which the different measures could relate to the IDESTE. Changes to the IDESTE that would increase the sensitivity of the instrument would provide a better sense of whether the IDESTE can be a viable addition to the array of measurements already existing in the system.

The means for statewide results in the other measures (ACT scores, grade point average, Praxis I™ scores, and C-Base scores) were closer to a normal distribution (see Appendix B). The ACT results were similar to statewide results for all students taking the ACT (Iowa Department of Education, 2005).

The analyses in Chapter 4 appear to indicate that the IDESTE has solid reliability and construct validity. Additionally, assuming some suppression effect is present when

looking at relationships between IDESTE and other measures, there is emerging evidence of some degree of concurrent validity as well. The larger question, then, remains. Does the IDESTE lend added value to a system that already has several content measures in place? It appears that the answer is a tentative “yes.” One possible explanation for the weak relationships between IDESTE and other measures was that the IDESTE simply does not measure content adequacy in a meaningful way. Again, this conclusion flies in the face of the reliability and validity data. Another possible explanation is that the IDESTE measures different information than is measured by the other assessments. If this assumption is supported, then the information IDESTE provides is different compared to data already existing in the system.

Clearly, data from the ACT, Praxis I™, and C-Base are strongly interrelated. It could be said that these assessments measure similar knowledge in similar ways. A weaker relationship between these three measures compared to grade point average and IDESTE data would seem to say that the later two assessments were not measuring precisely the same information in the same way. This would support one of the original assumptions made by the Department of Education that information provided by a cooperating teacher after working with a student teacher for several weeks was different in both breadth and depth from what was provided by a paper and pencil test. This study cannot gauge the degree to which the measures differ on the assessment of breadth and depth of knowledge, but it seems to support the idea that the IDESTE measures something other than the knowledge assessed by paper and pencil tests.

These findings also may imply that the addition of another measure of content knowledge that is known to be highly correlated to other assessments like the ACT, Praxis I™, and C-Base would provide little value-added to the current system, since similar data already exist. Further analysis should be done to see if an assessment like the Praxis II™ enhances or simply duplicates the body of knowledge that already exists in the system. In this light, IDESTE may have a unique position to offer an assessment of the system that is not currently available through any other measure.

### Study Implications

The results of this dissertation contribute to closing the gap in current research by: (a) developing and pilot testing an instrument that has the potential to provide additional information on the quality of content area preparation of elementary-level preservice teachers; (b) linking this measurement to current research findings, and (c) identifying possible next steps in efforts to gain a comprehensive view of what preservice teachers know and are able to do. The preliminary findings, however, contain suggested implications that should be pursued related to quality educational practices, additional educational research, and comprehensive policies addressing the measurement of the quality of content knowledge of preservice teachers, particularly at the elementary level.

#### *Implications for Education Practice*

Educators at all levels must be invested in the notion that all teachers must be prepared adequately in the content area(s) in which they teach. Available research clearly supports a need for some sort of minimal content and skill knowledge for all teachers in the content areas they teach. Mechanisms must exist that comprehensively



assess the quality of the student teacher and classroom teacher. Adequate content knowledge is a necessary, but not sufficient, condition that must exist for a quality learning environment to occur (Darling-Hammond, 2004; Marzano, 2004; Sanders & Rivers, 1996).

This system of accountability and assurances starts with the preparation of teachers and continues into the actual practice of teaching in schools. States, in cooperation with teacher preparation programs, must establish minimum expectations related to content adequacy. These systems must be varied and comprehensive and must demonstrate the ability to determine accurately whether a potential teacher has the skills and knowledge to perform adequately in the teaching profession, thereby justifying the trust the public places in the institutions that exist to maintain the quality of the profession and ensure our students are receiving the best possible educational supports (Ferguson, 1991).

Individual teachers also must value continued learning and professional development. Content knowledge is not static, and clearly interplays with instructional efficacy (Poliakoff, 2002; Strauss & Sawyer, 1986; Wenglinsky, 2000). Preservice teachers graduating from teacher preparation programs are not finished products, and on-going support is needed to ensure that the knowledge and skills they possess stays relevant (Marzano, Pickering, & Pollock, 2001; Penick & Yager, 1983).

#### *Implications for Educational Research*

Although the literature review has revealed a number of studies that examined the themes identified in the process used to measure adequacy of preservice teacher content knowledge, few studies attempted to quantify the quality of student teacher

content knowledge using structured input from cooperating teachers on a statewide scale. The use of the IDESTE instrument is at least a new approach for Iowa in this process of meeting federal expectations and providing quality control over the teacher development process.

Numerous studies exist documenting the need for prospective teachers to have a solid foundation of content knowledge prior to entering actual practice. Additional studies reinforce the need for teacher preparation programs to ensure that preservice teachers are prepared adequately in the content areas in which they will deliver instruction. Existing research, however, is conflicted on the “best” way to provide these assurances or document (quantify) a specific level of minimum content level adequacy.

Assessments like the ACT, the Praxis™ series, and others clearly do a fine job of measuring what they are intended to measure. Moreover, it is not coincidental that they all correlate highly with one another. There are limits to the types and scope of content knowledge that can be measured by a norm-referenced, standardized, paper and pencil test (Browne & Rankin, 1986; Christmann & Badgett, 2001; Mayer, 1999). The debate, then, for policymakers in relation to the research is over (1) what content is important, (2) what are the various ways the state can validate adequate preparation on these items it thinks are important and (3) whether standardized, norm-referenced, paper and pencil tests are enough to assure the public of the adequate content preparation of the teaching workforce? There is a consensus in the research and policy community that “adequate content preparation” means something more than the content measured by a standardized test (Darling-Hammond, 2000; Marzano, 2004).

The research is also clear that the assessment of this “content knowledge beyond standardized tests” is a difficult issue to assess. The validation of content knowledge beyond what is measured by standardized tests appears to fall into two or three categories; (1) content area coursework requirements, (2) minimum grade point requirements, and (3) subjective evaluations by supervisors and peers, into which falls experience-based learning and the IDESTE. Because the research is not definitive in this area and it appears that many believe content knowledge is a broader concept than the information measured by a standardized test, further efforts like the IDESTE should continue because they have the potential to lend some structure and measurability to an area of research that is notoriously devoid of clear results. The value added to the system by an effort like the IDESTE project is the overlay of some sort of structure and quantification of a process that appears to be necessary, but is also inherently subjective.

Additional research on methods of validating content adequacy is clearly necessary. From a policy perspective, there is constant pressure to document a discernable student achievement effect as a result of any new effort in education. This is always a problematic issue to address because of the complexity of the process of learning and the number of variables that have some degree of effect on learning outcomes (Dybdahl, Shaw, & Edward, 1997; Ferguson & Womack, 1993). The arguments for some sort of standardized measure of content knowledge center much more on political realities than on research findings. There is little in existing research to support any positive or negative impact on student learning or the quality of classroom instruction from implementing a measure like the Praxis II™ (Darling-Hammond, 2004;

Guyton & Farokhi, 1987; Mee, 1999). However, that assertion does not negate the need for policymakers and educators to continue to work to assure the public of the adequacy of preparation of prospective teachers. Studies like the IDESTE and other similar efforts have the potential to add to that body of work.

*Implications for Developing Policies that promote better assessment of preservice teachers' adequacy of content knowledge*

If policymakers in Iowa believe that (1) content adequacy of prospective teachers is a necessary condition for quality instruction and (2) content knowledge as a concept is broader than a paper and pencil test, then state-level laws, rules, policies, and the implementation of those statutes should align to those beliefs. Teacher preparation programs should be held accountable for the products they produce. School districts should ensure that teachers continue to stay current in the content areas instructed. The state should ensure the public has confidence in the process of teacher development and in the quality of the teaching profession.

If multiple measures are necessary to evaluate the broad scope of knowledge a teacher should have, then concurrent mechanisms should be in place to validate that position. Teacher preparation program accreditation standards and teacher licensing standards should support a broad content preparation for teachers. Student teaching experiences should be developed to ensure guided practice on the delivery of these broad areas of content coverage. Methods of validation and benchmarks for preparation should occur at regular checkpoints in the teacher preparation process. Efforts should be made to ensure as little duplication of effort as possible to keep the process efficient.

Throughout all of this, it must be clear to all stakeholders what information is valued and identified as a minimum expectation for prospective teachers.

Additional policy development may be necessary to ensure that the Iowa teacher development process adequately addresses minimum expectations for content knowledge. Stakeholders in this conversation must include educators and researchers as they best understand the complexities of the process of learning and the assets and barriers of the existing system, but should include policymakers as well so all parties understand the complexity of this issue from both sides. Whatever policies are in place should work to validate the state's process to develop teachers. The federalization of this issue holds no hope to ensure quality preparation of teachers at the end of the day – that is a policy implementation issue that every state must address and ensure within whatever set of expectations are in place. Key assurances that should be supported by local, state, and federal policy would include assuring the best measurement possible of content adequacy in the broadest sense, assuring minimal cost to the system overall, and creating structures to assure the public that the teaching force is adequately prepared.

### Conclusions and Recommendations

#### *Recommendations for revision and use of the IDESTE*

Continue to implement the IDESTE while making necessary adjustments to the instrument and process. Initial results of the analysis of the IDESTE are promising enough to continue the experiment. The information collected by the IDESTE appears to be different than any other piece of information currently in the system, which holds

great potential for a broader picture of the quality of content knowledge of prospective teachers as a result of conducting the IDESTE.

To adjust for concerns about the nonnormal distribution and lack of variability of IDESTE results that lead to reduced sensitivity of the instrument, additional versions of the IDESTE should be piloted that expand the scale of each content area measure and/or include content subcategories within each broad content area.

Additional, more detailed criteria for each IDESTE scale point or groups of scale points should be developed and additional training should be provided to all cooperating teachers to ensure efficacious implementation of the IDESTE instrument.

Electronic submission of the IDESTE would facilitate faster aggregation and more efficient analysis of results. Electronic submission also could provide more consistency on the quality of data submitted, ensuring complete data sets on every student teacher in all licensing areas.

If the complete IDESTE survey is not used for any purpose by the state, parts of the IDESTE could be eliminated in subsequent administrations to facilitate more direct measurement of only those topics that are necessary for accountability and validation.

#### *Recommendations for practice*

Data should be provided to each teacher preparation program to ensure that those with responsibility for the programs know whether students in that program are performing in a similar way in all content areas and how the performance of the program overall compares to statewide performance. These data also could be useful for remediation efforts with individuals and possible future professional development

opportunities, particularly if the IDESTE includes more detailed information by content subcategories.

Continue to compare the performance of the IDESTE with other measures, specifically including new comparisons with Praxis II™ now that it is required of all student teachers in Iowa. Other research showing that Praxis II™ correlates highly with other paper and pencil measures and Iowa data on the relationships between all of the measures in the system would be useful for future policy decisions.

Resist efforts to commit to the Praxis II in the long-term without additional study of both the Praxis II™ results and future iterations of the IDESTE. IDESTE is performance-based, making it unique to other assessments like the ACT, Praxis series, and C-Base. IDESTE is also free. Evidence should be gathered to determine if Praxis II is adding anything to the process that was not there before and whether the IDESTE is viable as a performance-based measure that covers a broader scope of knowledge than the other assessments. If Praxis II™ correlates highly with ACT and Praxis I™, there is little value added to the system as a result of this administration. IDESTE's low to moderate correlation with these other measures could indicate that it is tapping into a different set of information than those other assessments.

Teacher preparation programs and the Department of Education need to continue to seek ways of assessing adequacy of content knowledge in the broadest context. Whether the state uses the IDESTE or not, there is a role for performance-based assessments in this system. The research indicates that content knowledge is a necessary but not sufficient condition for quality classroom instruction and that it is the interplay between content and pedagogy that creates the potential for quality learning. If

this is true, then limiting the assessment of the quality of a teacher to a content test fails to recognize the performance portion of the process, namely the application of this content knowledge to the delivery of instruction.

### Summary

This dissertation research has investigated the validity and reliability of the IDESTE instrument and has provided initial comparisons of the IDESTE to other measures in the system. A team of experts including staff members from the Department of Education, the K-12 system, and teacher preparation programs, developed the IDESTE. The initial form of the IDESTE was administered to every student teacher in the state in 2005-06 and results were aggregated by the Department of Education. A subsample of this overall sample was identified, and additional data were collected on this subsample to compare with IDESTE performance. The IDESTE was found to have good reliability, face validity, and construct validity. Concurrent validity was solid as well, given the lack of variability of the IDESTE sample. Predictive validity is something that could be determined through subsequent administrations of the IDESTE.

Findings of the IDESTE indicate that cooperating teachers generally believe student teachers to have adequate content area preparation. In fact, roughly 60% of the scores submitted were "5" (highest score) on a 5-point range. While the other measures examined (ACT, Praxis I™, grade point average, and C-Base) all correlated to a higher degree, low to moderate correlations existed between these measures and the IDESTE results. This could mean that the instrument simply does not add value to this measurement of content competency, but that finding runs counter to the results of



construct and face validity and of reliability results. It is more likely that the IDESTE measures the construct of content adequacy in a different way than the other measures, which makes sense given that the IDESTE is more performance-based than any of the other measures (except for grade point average).

The pilot of this assessment suggests several implications for future practice, research, and development that should be considered for future programming and policy efforts. Attention to these implications and recommendations, described above, will contribute to moving the body of research forward and should help to ensure the provision of quality teachers in every learning environment in Iowa.

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## APPENDIX A. Relationships between IDESTE Content Areas within individual programs

*Spearman Rho values – content areas - Ashford*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.864	<0.0001	0.741	0.0003	0.753	0.0003
Math	0.864	<0.0001	1.00		0.789	<0.0001	0.740	0.0004
Science	0.740	0.0003	0.789	<0.0001	1.00		0.830	<0.0001
Soc Stud.	0.753	0.0003	0.740	0.0004	0.830	<0.0001	1.00	

*Spearman Rho values – content areas – Briar Cliff*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.537	0.015	0.333	0.191	0.293	0.270
Math	0.537	0.015	1.00		0.759	0.0004	0.731	0.0013
Science	0.333	0.191	0.759	0.0004	1.00		0.872	0.0001
Soc Stud.	0.293	0.270	0.731	0.0013	0.872	0.0001	1.00	

*Spearman Rho values – content areas – Buena Vista*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.706	<0.0001	0.680	<0.0001	0.609	<0.0001
Math	0.706	<0.0001	1.00		0.796	<0.0001	0.673	<0.0001
Science	0.680	<0.0001	0.796	<0.0001	1.00		0.723	<0.0001
Soc Stud.	0.609	<0.0001	0.673	<0.0001	0.723	<0.0001	1.00	

*Spearman Rho values – content areas - Central*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.705	<0.0001	0.863	<0.0001	0.700	<0.0001
Math	0.705	<0.0001	1.00		0.710	<0.0001	0.667	<0.0001
Science	0.863	<0.0001	0.711	<0.0001	1.00		0.735	<0.0001
Soc Stud.	0.700	<0.0001	0.667	<0.0001	0.735	<0.0001	1.00	

*Spearman Rho values – content areas - Clarke*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.811	<0.0001	0.711	0.0064	0.663	0.0098
Math	0.811	<0.0001	1.00		0.7510	0.0020	0.881	<0.0001
Science	0.711	0.0064	0.751	0.0020	1.00		1.00	<0.0001
Soc Stud.	0.663	0.0098	0.881	<0.0001	1.00	<0.0001	1.00	

*Spearman Rho values – content areas – Coe*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.713	0.0009	0.545	0.439	0.735	0.0008
Math	0.713	0.0009	1.00		0.782	0.0009	0.598	0.0145
Science	0.545	0.0439	0.782	0.0009	1.00		0.455	0.1088
Soc Stud.	0.735	0.0008	0.598	0.0145	0.455	0.1088	1.00	

*Spearman Rho values – content areas – Cornell*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.588	0.1648	0.445	0.3169	0.723	0.0662

Math	0.588	0.1648	1.00		0.640	0.1217	0.529	0.2226
Science	0.445	0.3169	0.640	0.1217	1.00		0.842	0.0174
Soc Stud.	0.723	0.0662	0.529	0.2226	0.842	0.0174	1.00	

*Spearman Rho values – content areas – Dordt*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.722	<0.0001	0.519	0.0008	0.591	0.0001
Math	0.722	<0.0001	1.00		0.487	0.0019	0.596	0.0001
Science	0.519	0.0008	0.487	0.0019	1.00		0.718	<0.0001
Soc Stud.	0.591	0.0001	0.596	0.0001	0.718	<0.0001	1.00	

*Spearman Rho values – content areas – Drake*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.601	0.0019	0.535	0.015	0.748	<0.0001
Math	0.601	0.0019	1.00		0.586	0.0066	0.418	0.0595
Science	0.535	0.0150	0.586	0.0066	1.00		0.676	0.0029
Soc Stud.	0.748	<0.0001	0.418	0.0595	0.676	0.0029	1.00	

*Spearman Rho values – content areas – Dubuque*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.855	<0.0001	0.776	0.0007	0.522	0.0382
Math	0.855	<0.0001	1.00		0.776	0.0007	0.770	0.0005
Science	0.776	0.0007	0.776	0.0007	1.00		0.876	0.0002

Soc Stud.	0.522	0.0382	0.770	0.0005	0.876	0.0002	1.00	
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*Spearman Rho values – content areas - Emmaus*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.672	0.0982	0.839	0.0760	0.963	0.0087
Math	0.672	0.0982	1.00		0.919	0.0276	0.853	0.0662
Science	0.839	0.0760	0.919	0.0276	1.00		1.00	<0.0001
Soc Stud.	0.962	0.0087	0.853	0.00662	1.00	<0.0001	1.00	

*Spearman Rho values – content areas – Faith Baptist*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.719	0.0011	0.891	<0.0001	0.770	0.0008
Math	0.719	0.0011	1.00		0.683	0.0050	0.658	0.0076
Science	0.891	<0.0001	0.683	0.0050	1.00		0.806	0.0009
Soc Stud.	0.770	0.0008	0.658	0.0076	0.806	0.0009	1.00	

*Spearman Rho values – content areas – Graceland*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.748	<0.0001	0.751	<0.0001	0.731	<0.0001
Math	0.748	<0.0001	1.00		0.723	<0.0001	0.723	<0.0001
Science	0.751	<0.0001	0.723	<0.0001	1.00		0.827	<0.0001
Soc Stud.	0.731	<0.0001	0.723	<0.0001	0.827	<0.0001	1.00	

*Spearman Rho values – content areas – Grand View*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.714	<0.0001	0.422	0.0283	0.788	<0.0001
Math	0.714	<0.0001	1.00		0.327	0.0956	0.530	0.0044
Science	0.422	0.0283	0.327	0.0956	1.00		0.581	0.0029
Soc Stud.	0.788	<0.0001	0.530	0.0044	0.581	0.0029	1.00	

*Spearman Rho values – content areas – Iowa Wesleyan*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.636	<0.0001	0.470	0.0005	0.672	<0.0001
Math	0.636	<0.0001	1.00		0.432	0.0015	0.525	0.0001
Science	0.470	0.0005	0.432	0.0015	1.00		0.575	<0.0001
Soc Stud.	0.672	<0.0001	0.525	0.0001	0.575	<0.0001	1.00	

*Spearman Rho values – content areas - Iowa*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.605	<0.0001	0.655	<0.0001	0.748	<0.0001
Math	0.605	<0.0001	1.00		0.688	<0.0001	0.651	<0.0001
Science	0.655	<0.0001	0.688	<0.0001	1.00		0.738	<0.0001
Soc Stud.	0.748	<0.0001	0.651	<0.0001	0.738	<0.0001	1.00	

*Spearman Rho values – content areas – Iowa State*

	LA		Math		Science		Soc Stud.	



LA	1.00		0.705	<0.0001	0.562	<0.0001	0.679	<0.0001
Math	0.705	<0.0001	1.00		0.630	<0.0001	0.717	<0.0001
Science	0.562	<0.0001	0.630	<0.0001	1.00		0.656	<0.0001
Soc Stud.	0.679	<0.0001	0.717	<0.0001	0.656	<0.0001	1.00	

*Spearman Rho values – content areas - Loras*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.842	<0.0001	0.816	<0.0001	0.646	0.0005
Math	0.842	<0.0001	1.00		0.792	<0.0001	0.602	0.0015
Science	0.816	<0.0001	0.792	<0.0001	1.00		0.912	<0.0001
Soc Stud.	0.646	0.0005	0.602	0.0015	0.912	<0.0001	1.00	

*Spearman Rho values – content areas – Luther*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.895	<0.0001	0.681	<0.0001	0.717	<0.0001
Math	0.895	<0.0001	1.00		0.677	0.0001	0.667	0.0005
Science	0.681	<0.0001	0.677	0.0001	1.00		0.903	<0.0001
Soc Stud.	0.717	<0.0001	0.667	0.0005	0.903	<0.0001	1.00	

*Spearman Rho values – content areas - Morningside*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.899	<0.0001	0.721	0.0011	0.927	<0.0001
Math	0.899	<0.0001	1.00		0.718	0.0012	0.881	<0.0001

Science	0.721	0.0011	0.718	0.0012	1.00		0.899	<0.0001
Soc Stud.	0.927	<0.0001	0.881	<0.0001	0.899	<0.0001	1.00	

*Spearman Rho values – content areas – Mount Mercy*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.345	0.0392	0.503	0.0039	0.464	0.0074
Math	0.345	0.0392	1.00		0.399	0.0260	0.722	<0.0001
Science	0.503	0.0039	0.399	0.0260	1.00		0.550	0.0036
Soc Stud.	0.464	0.0074	0.722	<0.0001	0.550	0.0036	1.00	

*Spearman Rho values – content areas – Northern Iowa*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.656	<0.0001	0.563	<0.0001	0.589	<0.0001
Math	0.656	<0.0001	1.00		0.544	<0.0001	0.605	<0.0001
Science	0.563	<0.0001	0.544	<0.0001	1.00		0.662	<0.0001
Soc Stud.	0.589	<0.0001	0.605	<0.0001	0.662	<0.0001	1.00	

*Spearman Rho values – content areas – Northwestern*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.752	<0.0001	0.777	<0.0001	0.642	0.0003
Math	0.752	<0.0001	1.00		0.760	<0.0001	0.528	0.0039
Science	0.777	<0.0001	0.760	<0.0001	1.00		0.645	0.0009
Soc Stud.	0.642	0.0003	0.528	0.0039	0.645	0.0009	1.00	

*Spearman Rho values – content areas - Simpson*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.431	0.1240	1.00	<0.0001	0.911	<0.0001
Math	0.431	0.1240	1.00		0.388	0.2126	0.303	0.3656
Science	1.00	<0.0001	0.388	0.2126	1.00		1.00	<0.0001
Soc Stud.	0.911	<0.0001	0.303	0.3656	1.00	<0.0001	1.00	

*Spearman Rho values – content areas – St. Ambrose*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.586	<0.0001	0.410	0.0106	0.307	0.0688
Math	0.586	<0.0001	1.00		0.666	<0.0001	0.577	0.0002
Science	0.410	0.0106	0.666	<0.0001	1.00		0.792	<0.0001
Soc Stud.	0.307	0.0688	0.577	0.0002	0.792	<0.0001	1.00	

*Spearman Rho values – content areas – Upper Iowa*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.653	<0.0001	0.667	<0.0001	0.534	<0.0001
Math	0.653	<0.0001	1.00		0.559	<0.0001	0.503	<0.0001
Science	0.667	<0.0001	0.559	<0.0001	1.00		0.523	<0.0001
Soc Stud.	0.534	<0.0001	0.503	<0.0001	0.523	<0.0001	1.00	

*Spearman Rho values – content areas - Waldorf*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.055	0.8810	1.00	<0.0001	1.00	<0.0001
Math	0.055	0.8810	1.00		0.4	0.4320	0.325	0.4327
Science	1.00	<0.0001	0.4	0.4320	1.00		1.00	<0.0001
Soc Stud.	1.00	<0.0001	0.325	0.4327	1.00	<0.0001	1.00	

*Spearman Rho values – content areas – Wartburg*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.511	0.0020	0.622	0.0003	0.538	0.0022
Math	0.511	0.0020	1.00		0.585	0.0007	0.752	<0.0001
Science	0.622	0.0003	0.585	0.0007	1.00		0.604	0.0011
Soc Stud.	0.538	0.0022	0.752	<0.0001	0.604	0.0011	1.00	

*Spearman Rho values – content areas – William Penn*

	LA		Math		Science		Soc Stud.	
LA	1.00		0.638	0.0033	0.777	<0.0001	0.139	0.6221
Math	0.638	0.0033	1.00		0.620	0.0046	0.4	0.1396
Science	0.777	<0.0001	0.620	0.0046	1.00		0.316	0.2509
Soc Stud.	0.139	0.6221	0.4	0.1396	0.316	0.2509	1.00	

APPENDIX B. Score distribution figures

Figure 1 - IDESTE composite scores distribution

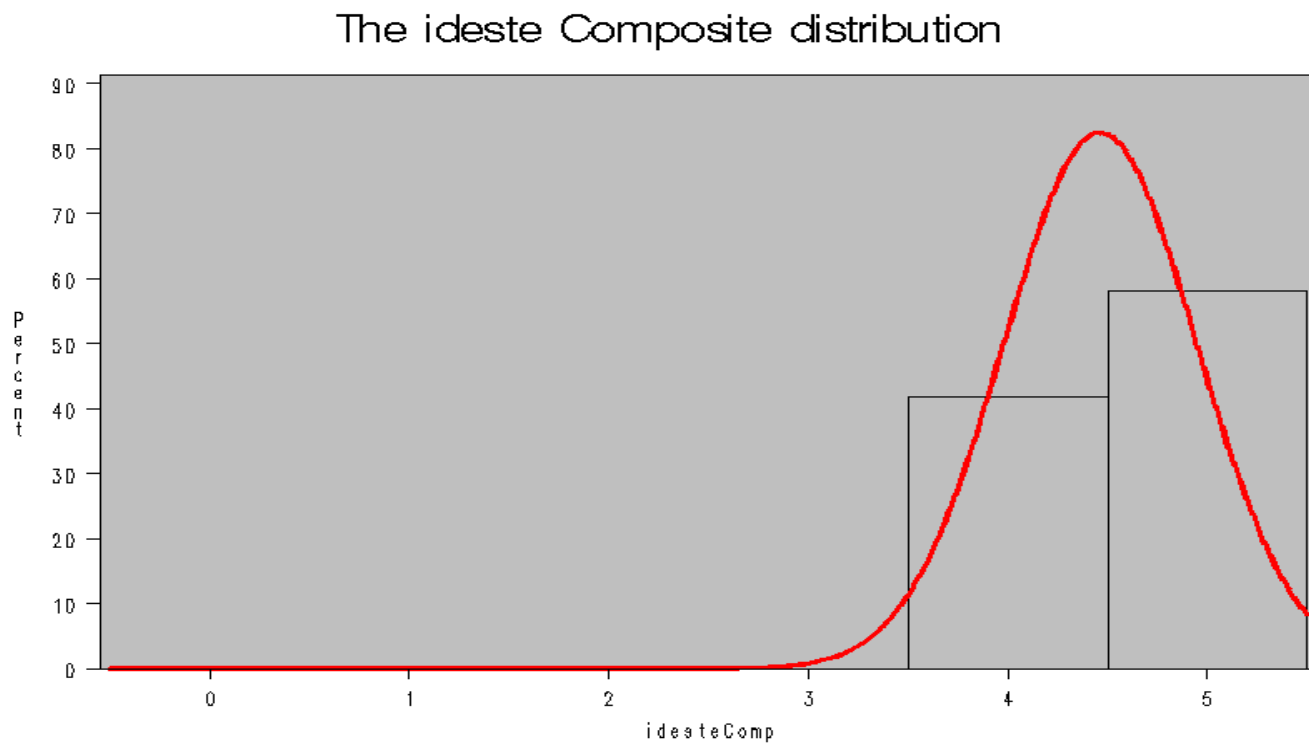


Figure 2 - IDESTE Language Arts scores distribution

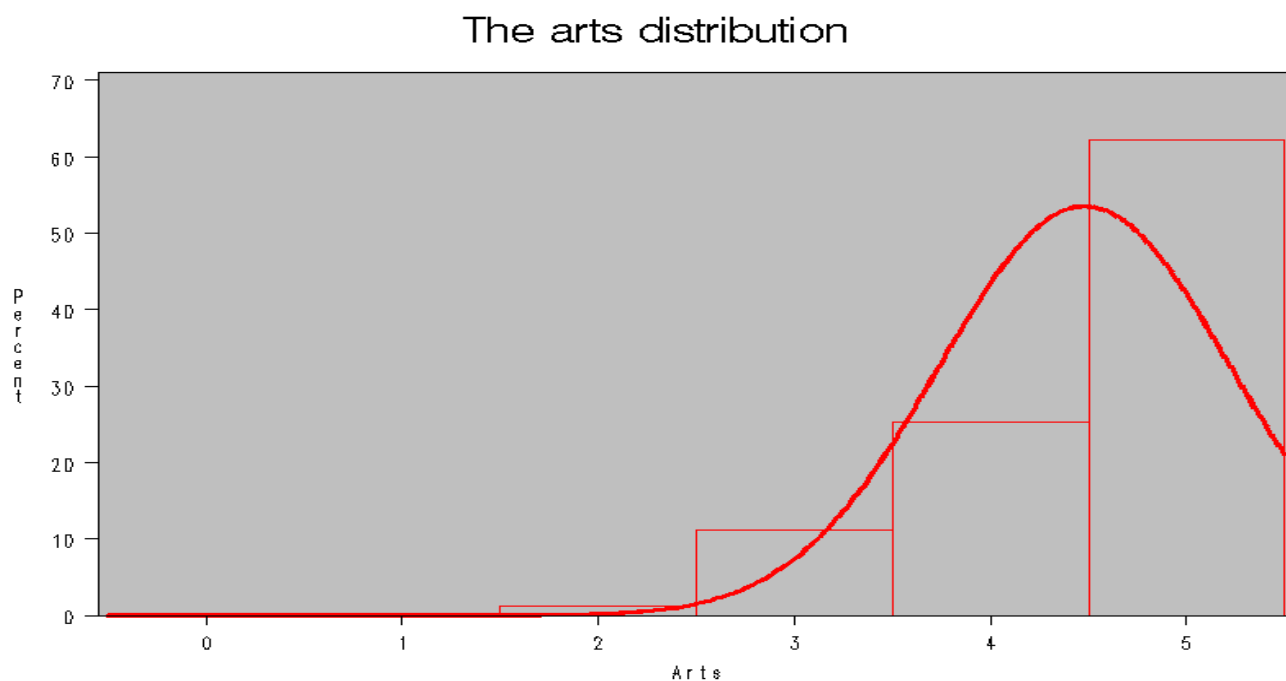


Figure 3 - IDESTE Math scores distribution

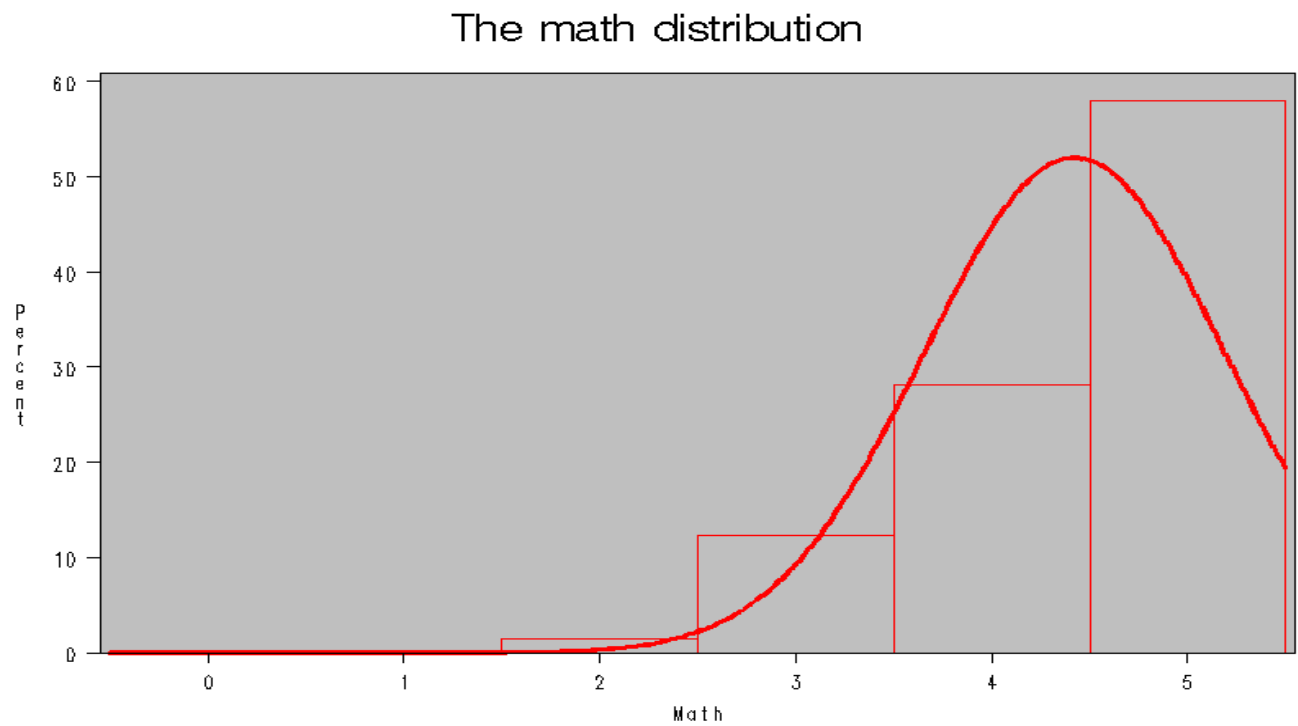


Figure 4 - IDESTE Science scores distribution

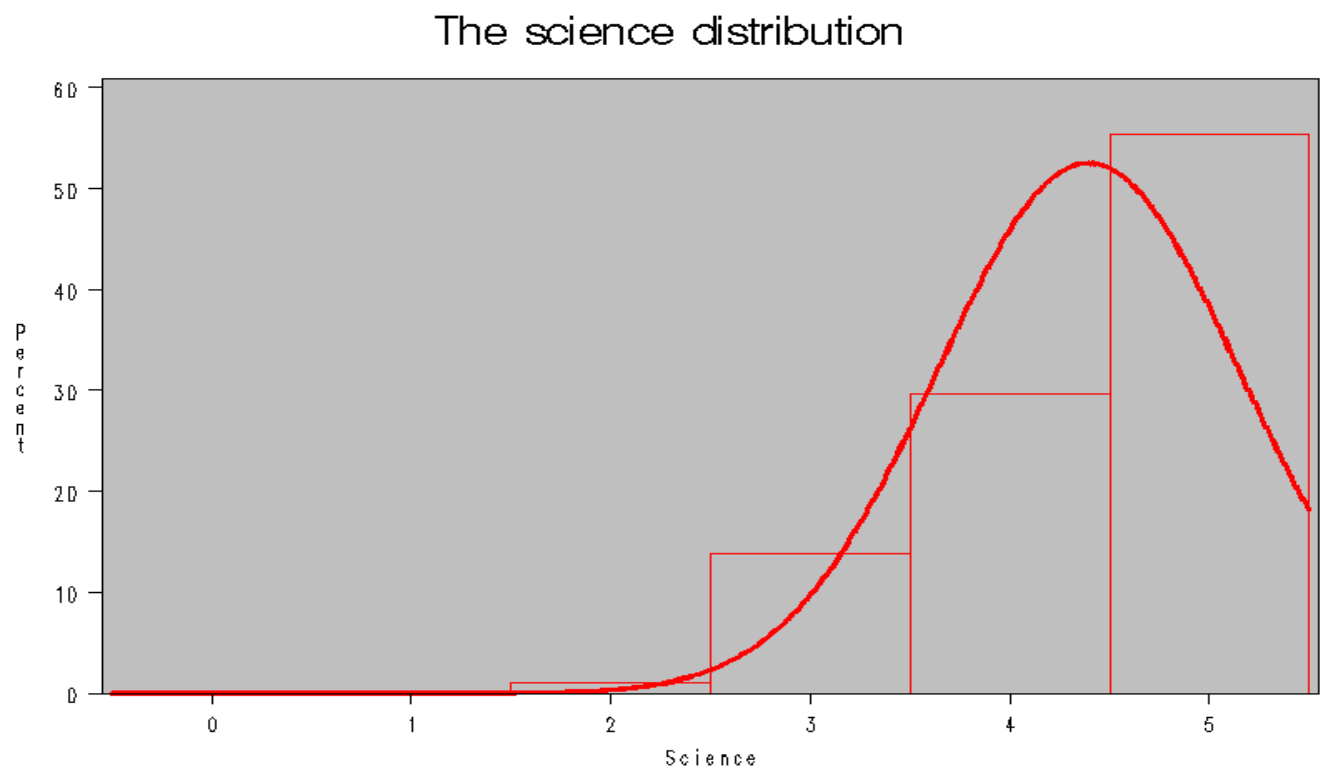


Figure 5 - IDESTE Social Studies scores distribution

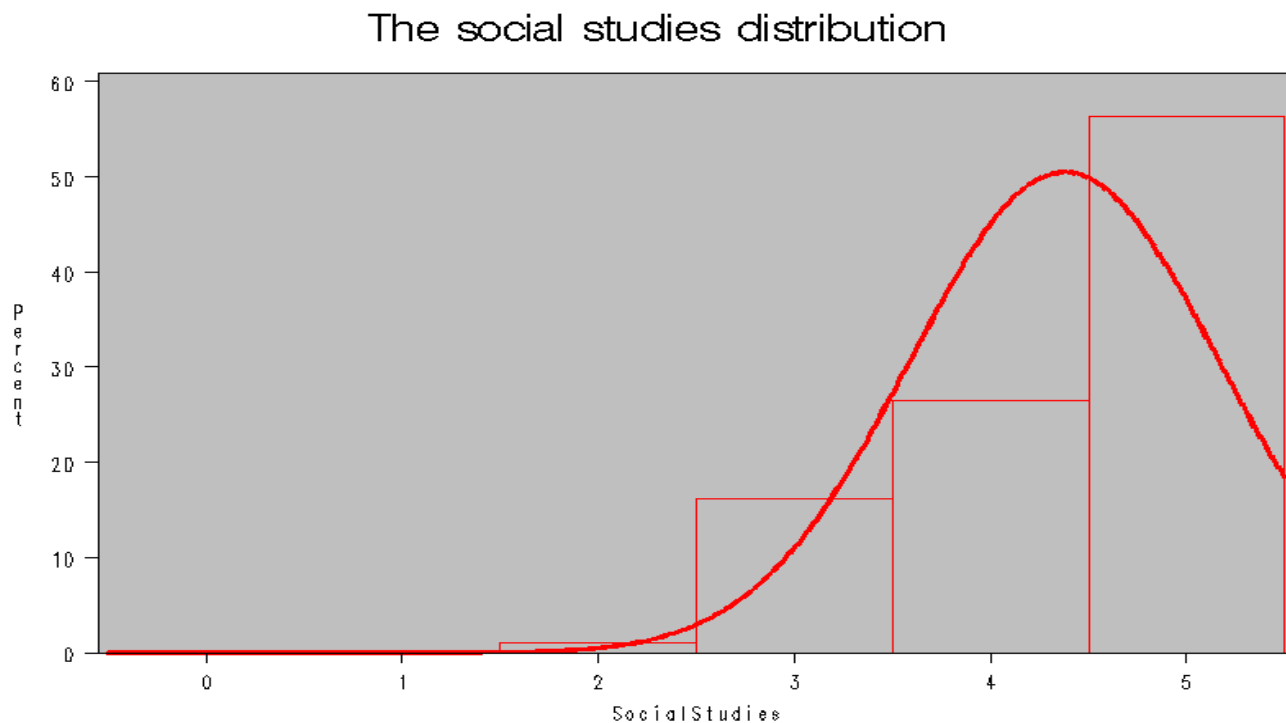


Figure 6 - ACT Composite scores distribution

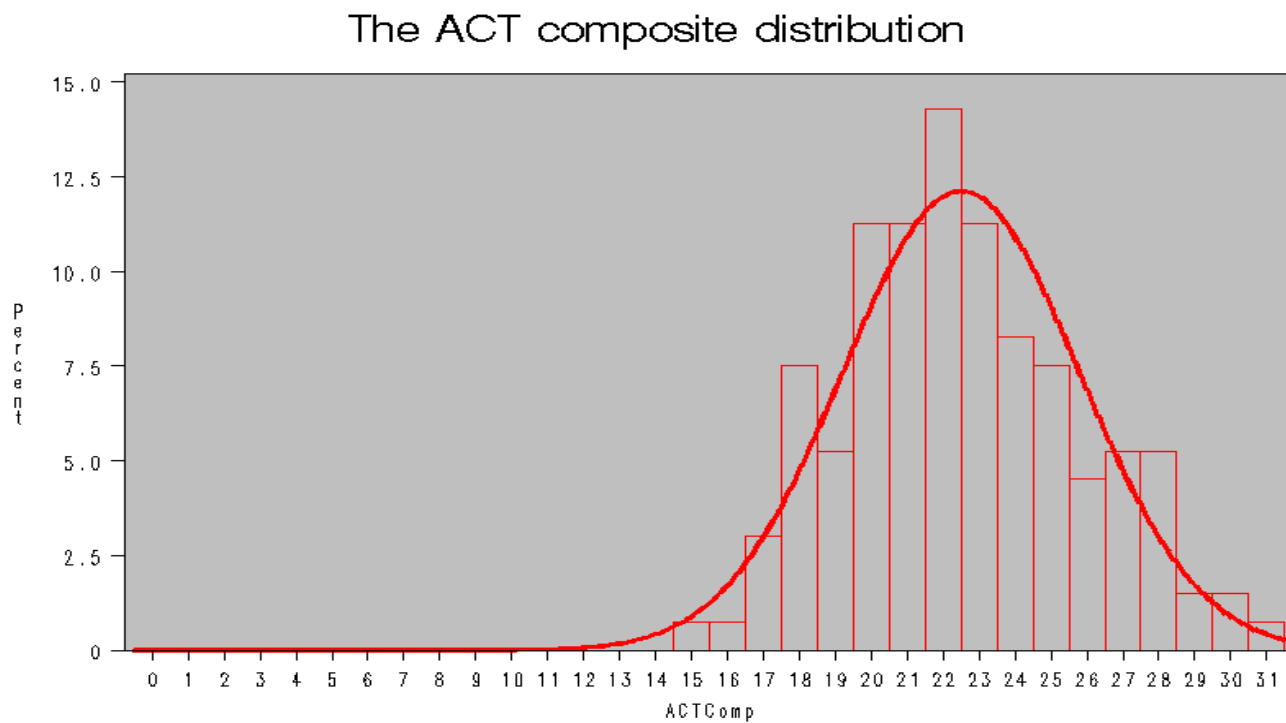


Figure 7 - ACT English/Language Arts scores distribution

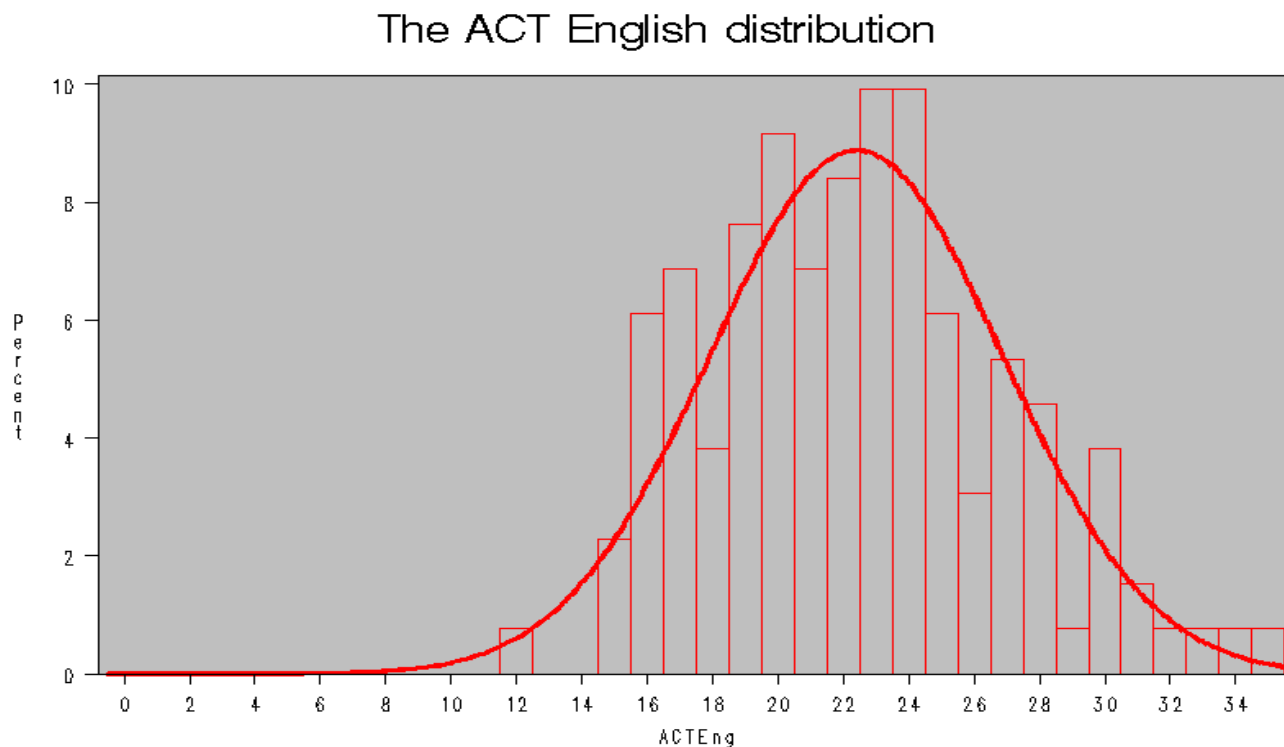


Figure 8 - ACT Math scores distribution

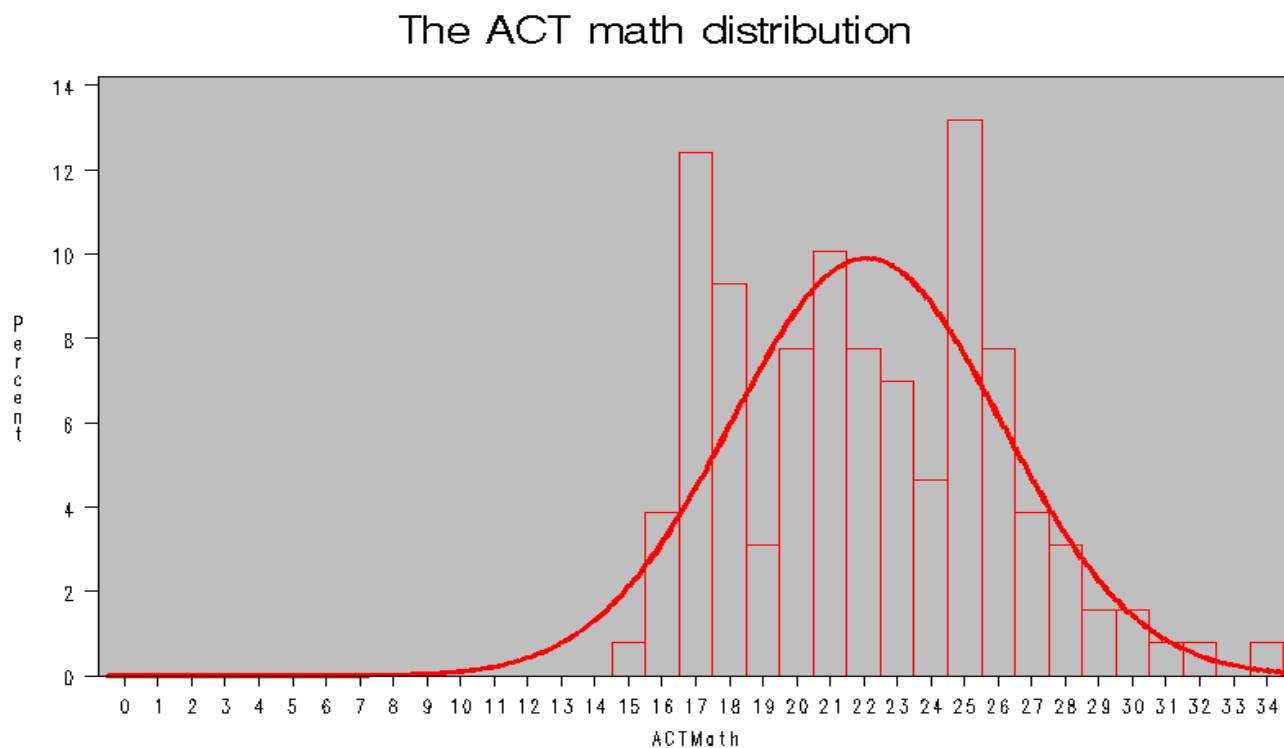




Figure 9 - ACT Reading scores distribution

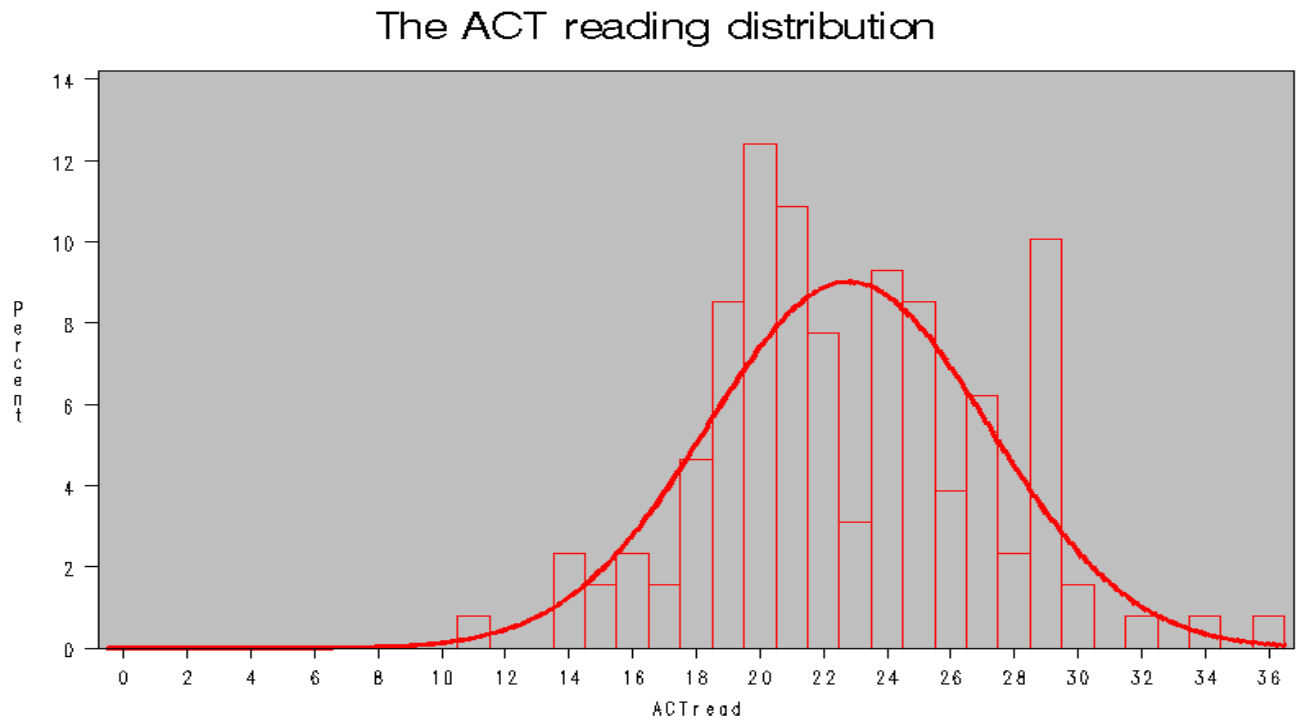


Figure 10 - ACT Science scores distribution

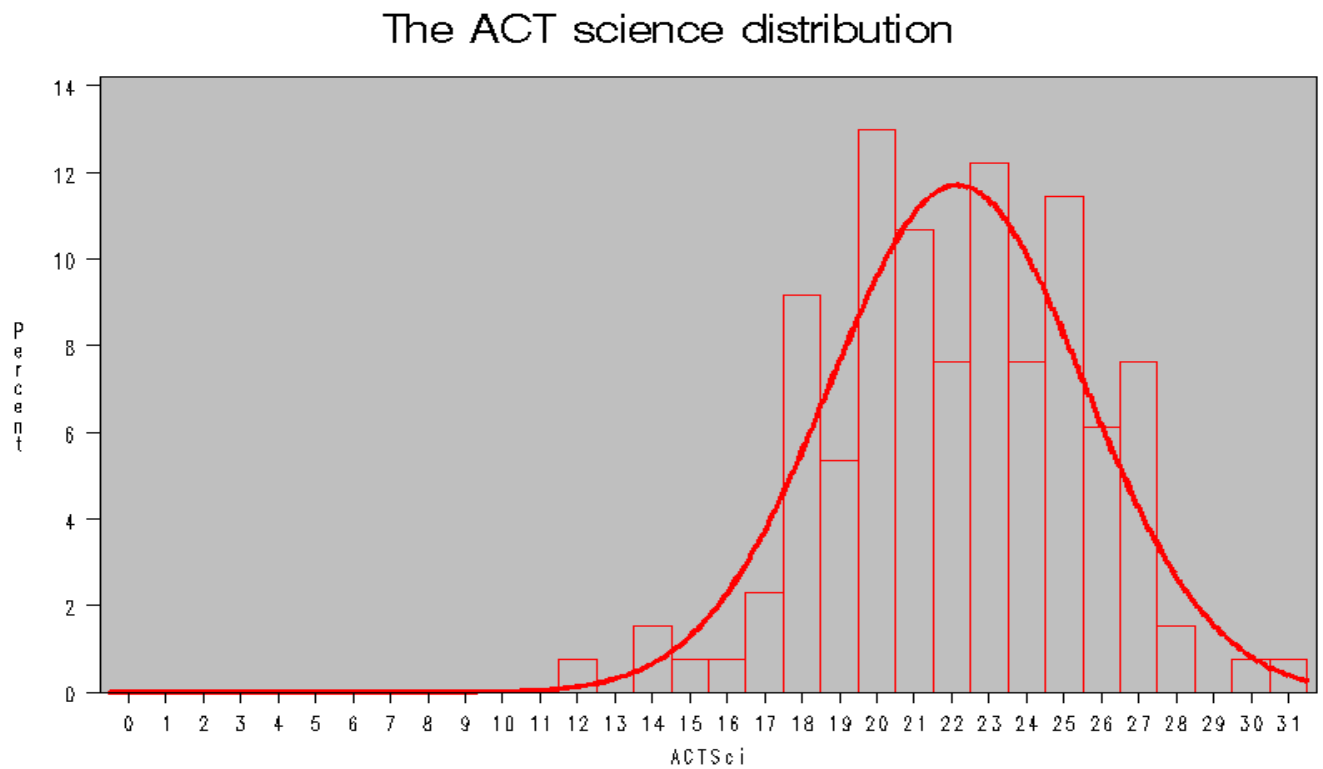


Figure 11 - Grade Point Average distribution

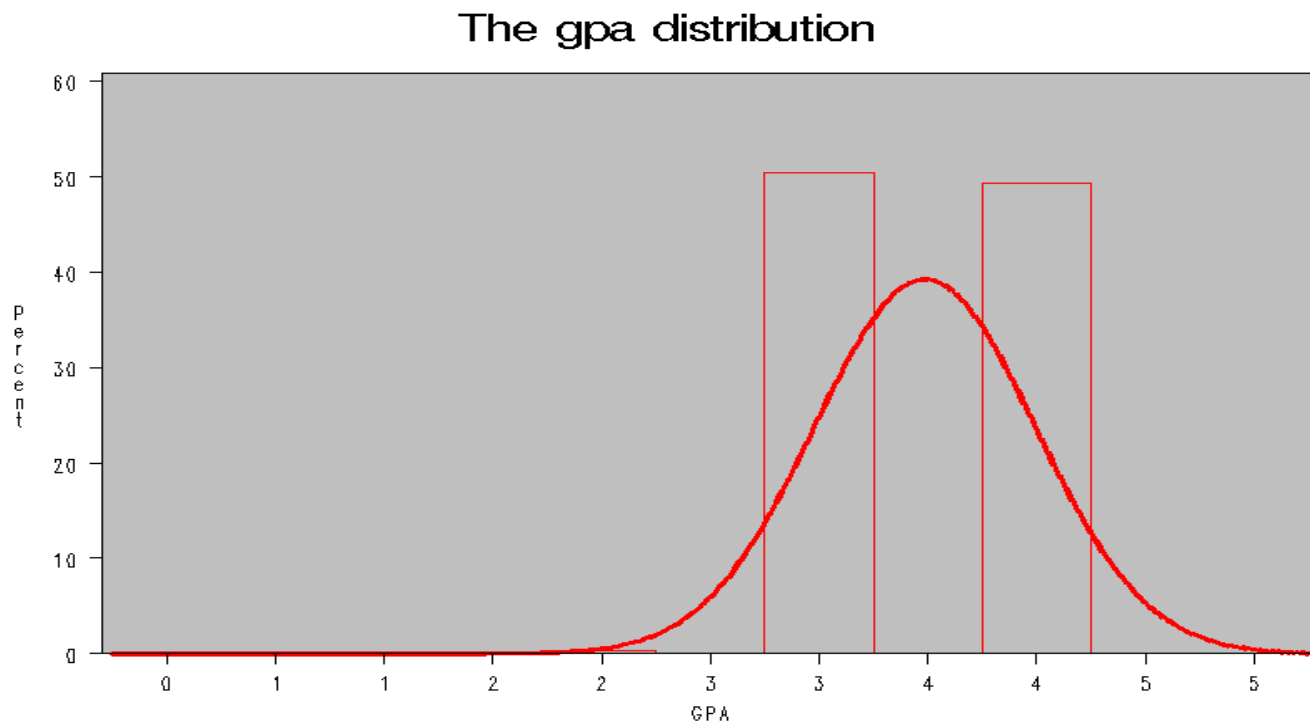


Figure 12 - Praxis I Composite scores distribution

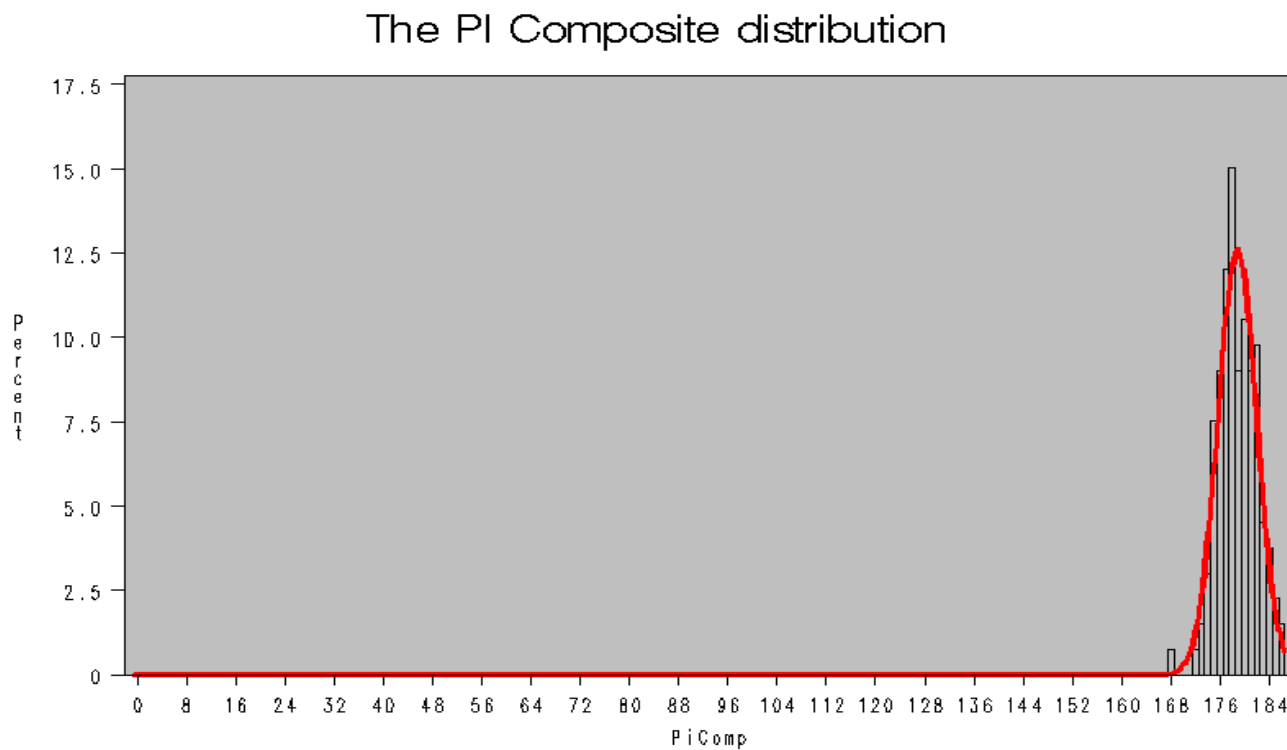


Figure 13 - Praxis I Reading scores distribution

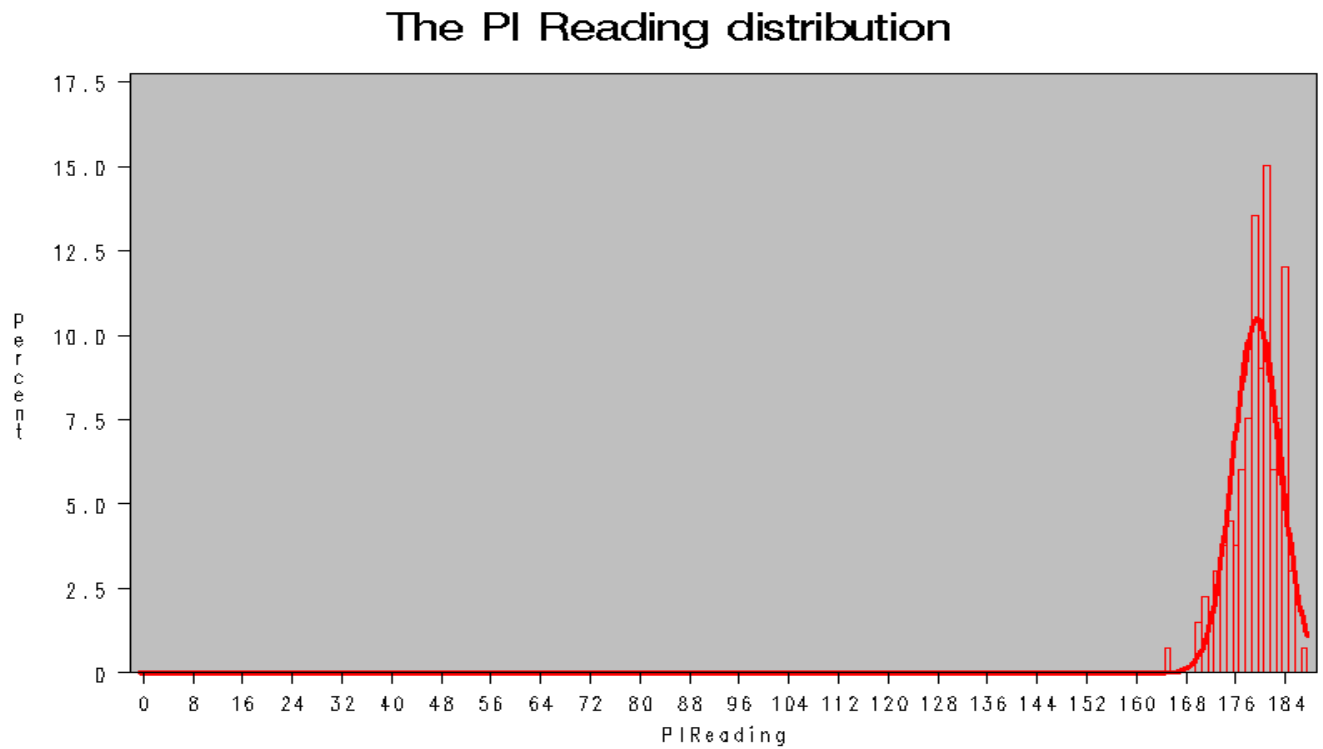


Figure 14 - Praxis I Math scores distribution

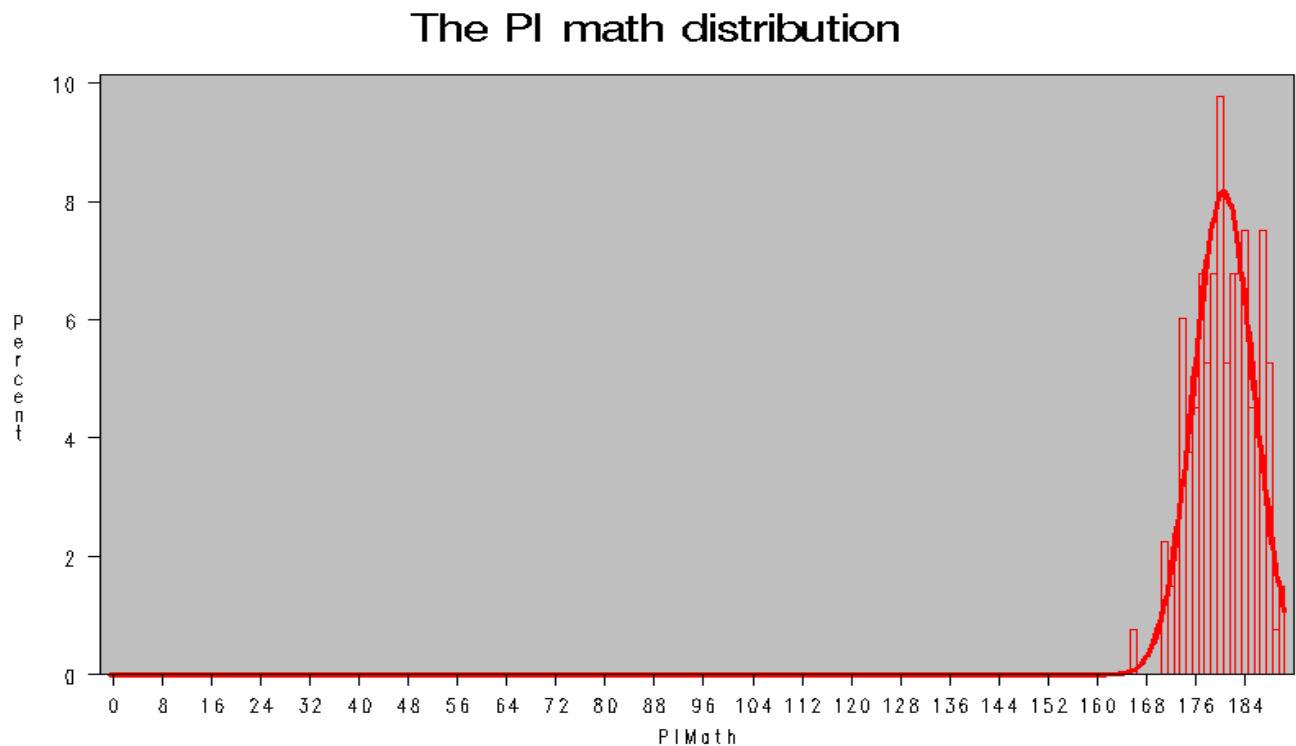


Figure 15 - Praxis I Writing scores distribution

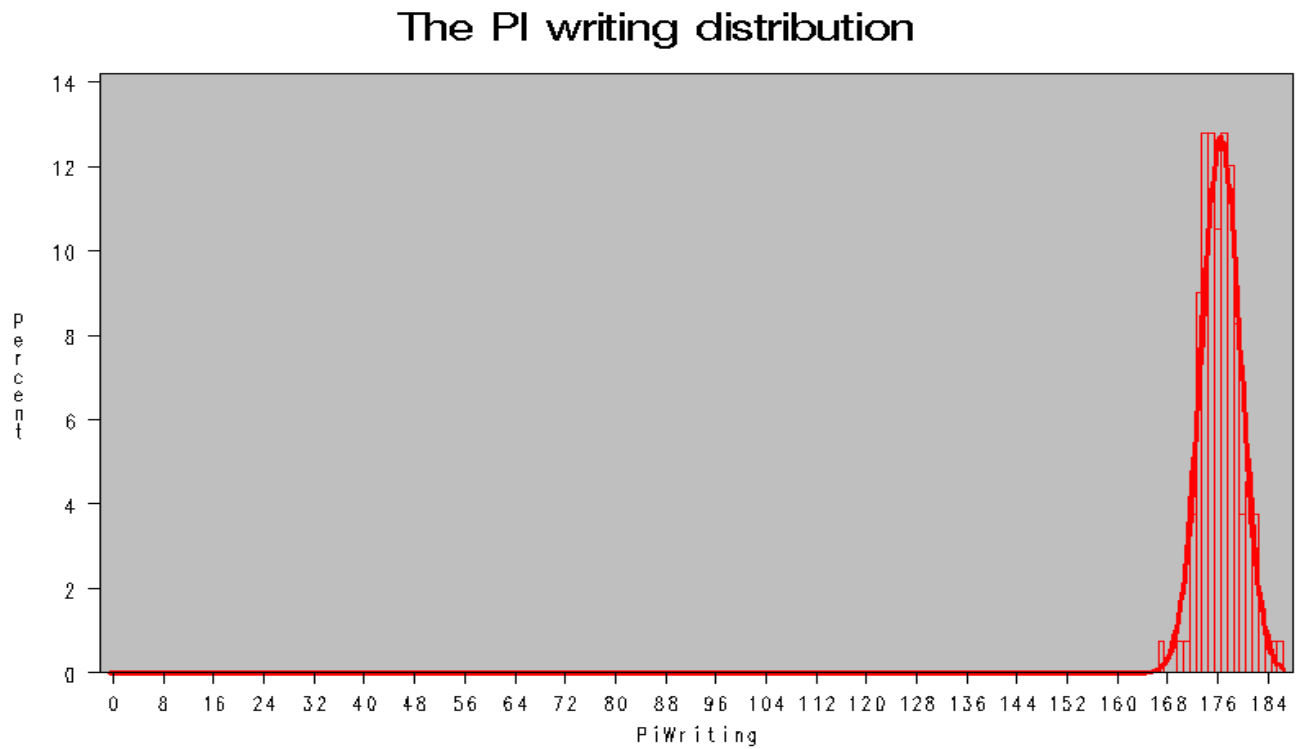


Figure 16 - C-Base Composite scores distribution

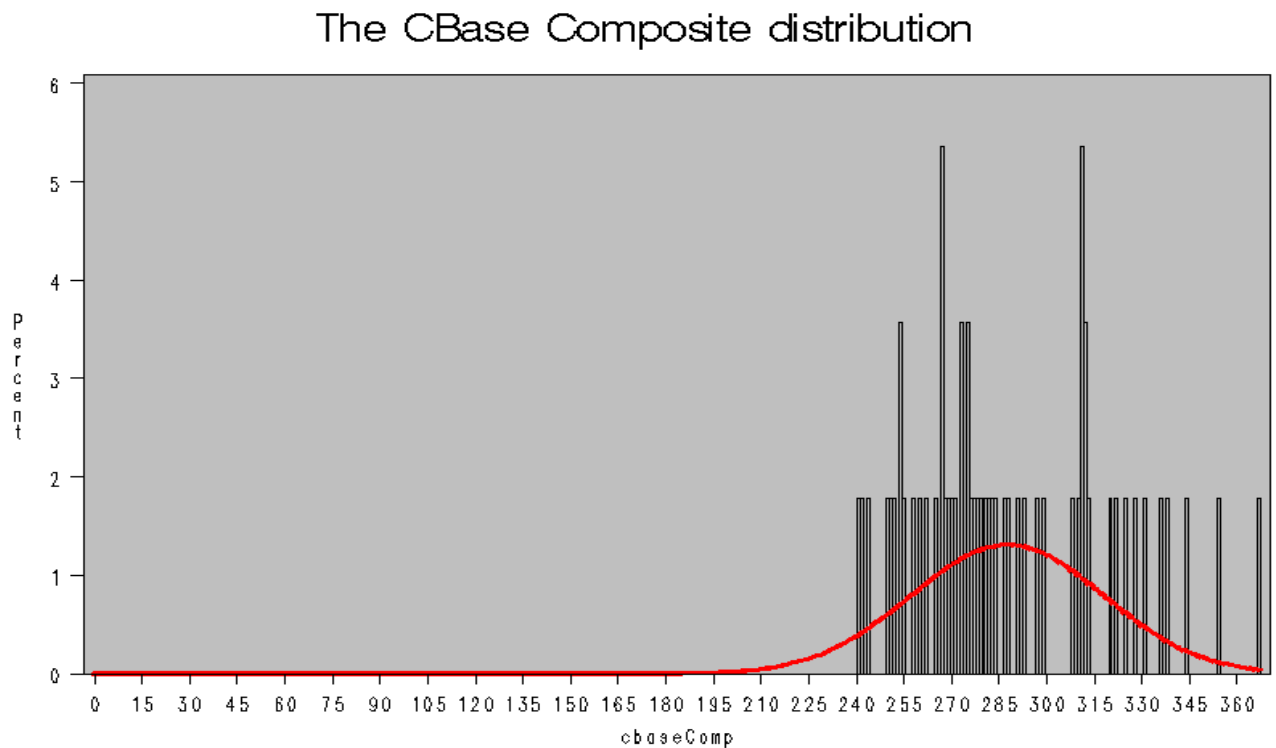


Figure 17 - C-Base Reading scores distribution

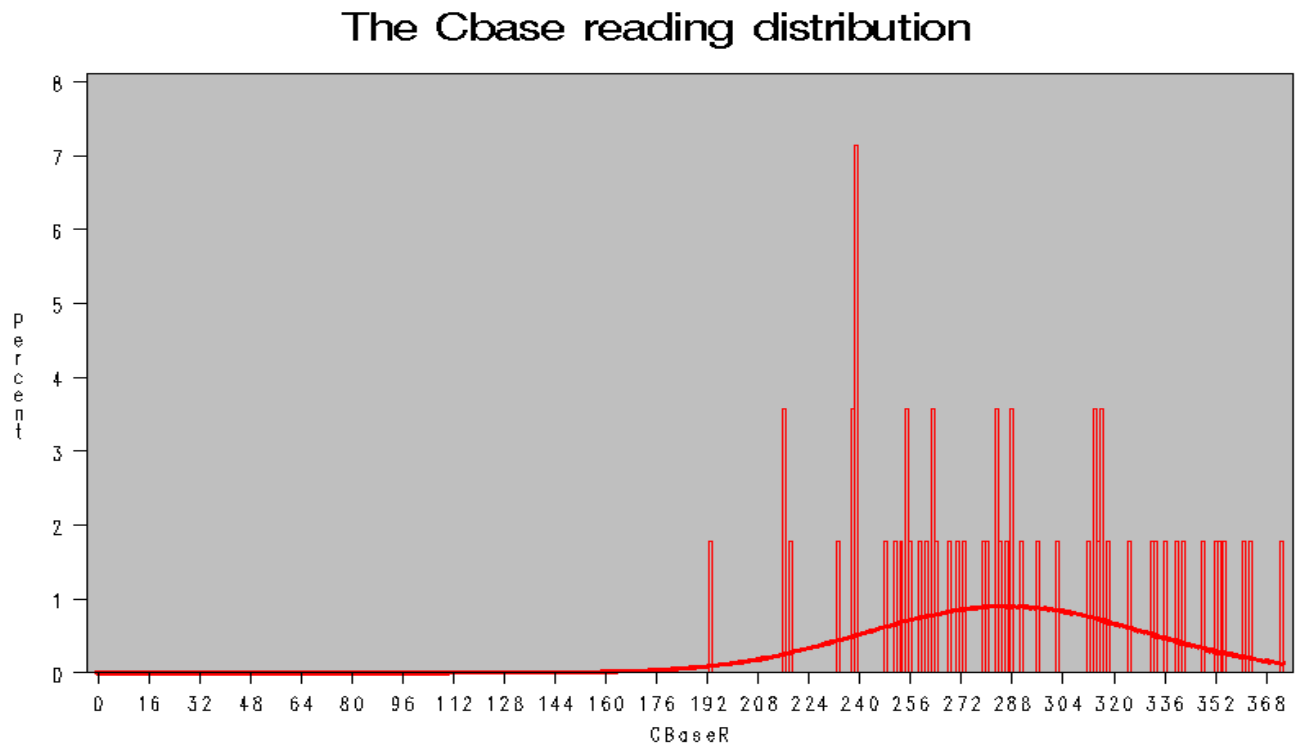


Figure 18 - C-Base Math scores distribution

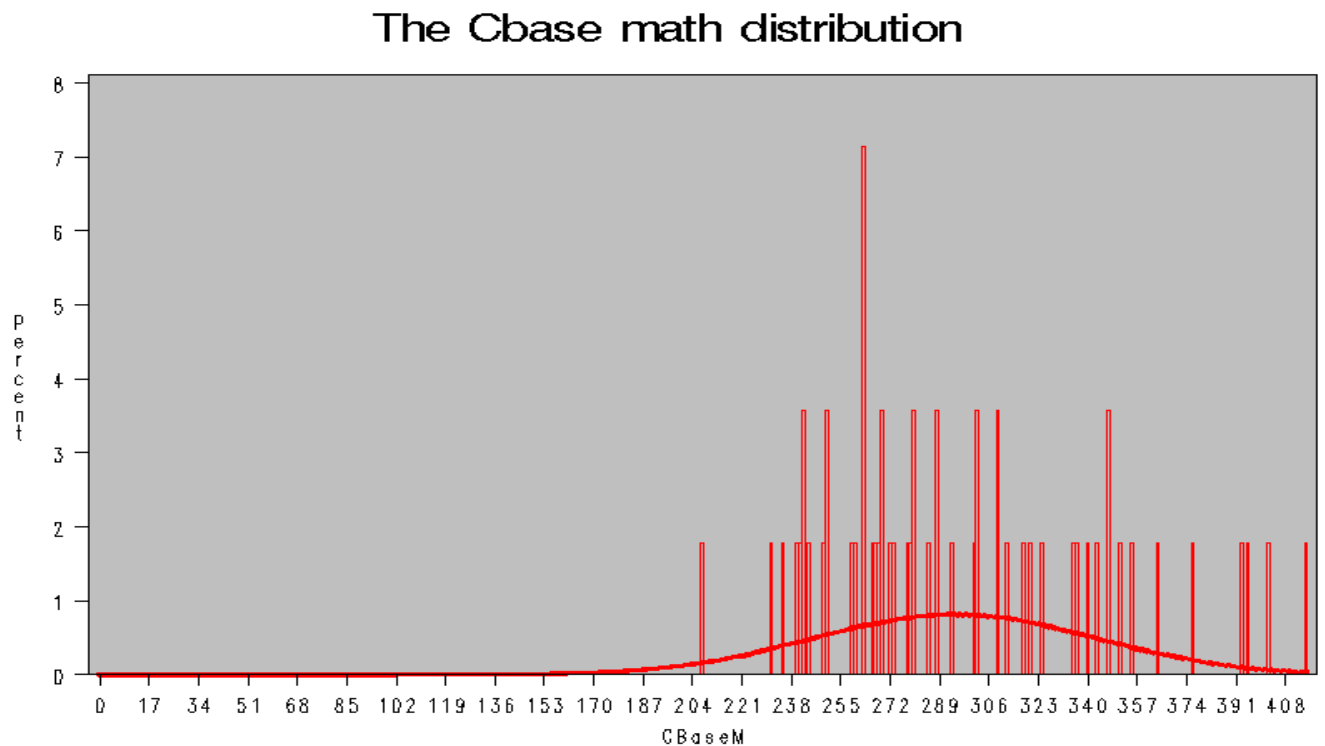
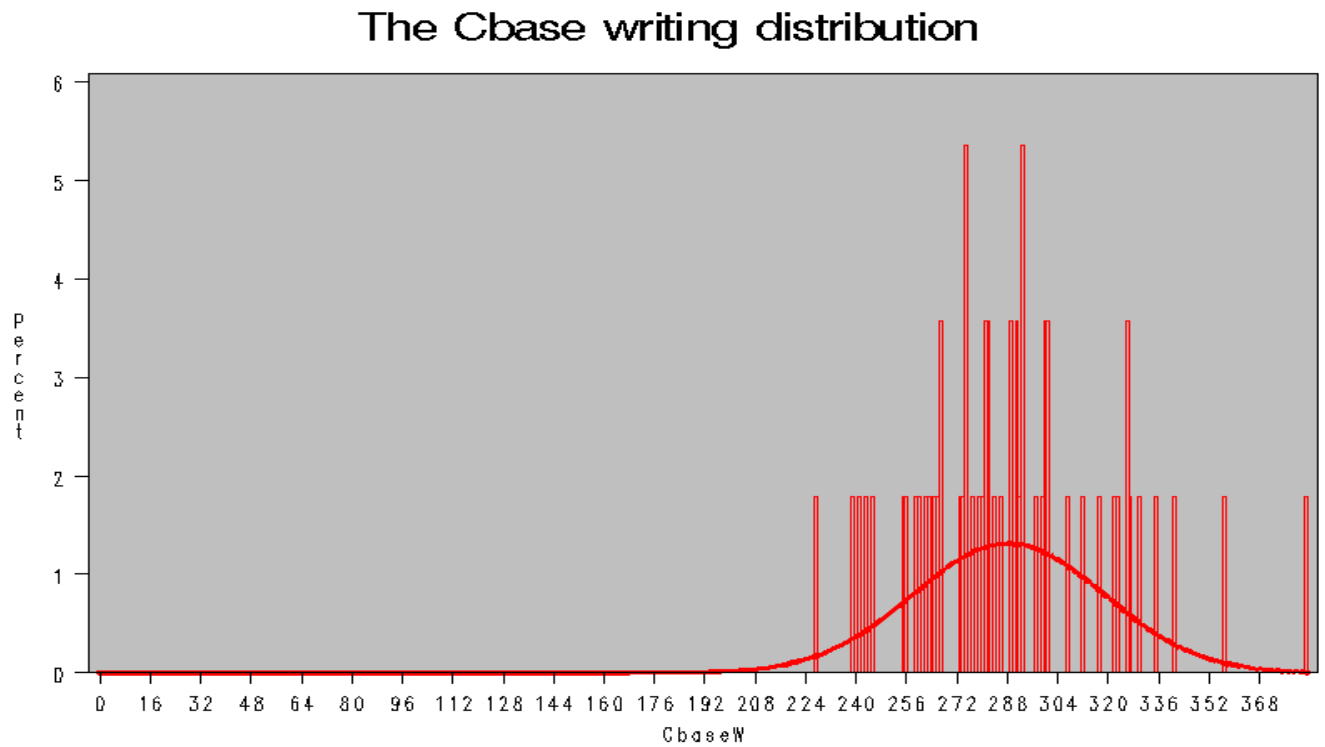


Figure 19 - C-Base Writing scored distribution



## APPENDIX C. Student Teacher Praxis II™ Request Letter

TO: Student/Graduates who student taught during the spring of 2006

FROM: Arlie Willems, Administrative Consultant for Teacher Preparation,  
Iowa Department of Education

RE: Research study of the Iowa Department of Education Student Teaching  
Evaluation

DATE: April 25, 2006

Congratulations on completing your student teaching experience. We know that you put much time and effort into this important aspect of your preparation. We wish you the best as you begin your teaching career.

As you all know, Iowa does not require you to take the Praxis II Exam for licensure. If you did NOT take the Praxis II, you may ignore this request.

**If you DID take the Praxis II, please read on.**

As you finished your student teaching experience, your cooperating teacher completed an evaluation of your work on a form called the Iowa Department of Education Student Teacher Evaluation (IDESTE). At this point, this survey is used in place of a test for licensure. (Relax. Your program would have told you by now if you did not pass. ☺)

The Iowa Department of Education is in the process of conducting a study of this student teaching evaluation form. Results of this study could be **critical** in determining whether future student teachers will be required to take the Praxis II Exam. This study includes comparisons of IDESTE scores with Praxis II scores; therefore, **only those of you who took the Praxis II are asked to submit information.**

Please read the other forms attached in this e-mail, sign them and send them to Linda Choate at the Iowa Department of Education **as soon as possible after receiving your Praxis II test results (target – May 31).** (Address is on the forms.)

All information in this study is confidential and your participation, while highly needed and desired, is voluntary. No information collected will be kept in individual files or used in any way to evaluate you as a student teacher. The information will be used **only** to determine the validity of the evaluation instrument used by the state.

Thank you for your assistance in this effort. Again, we wish you the best – whether you plan to teach in Iowa or elsewhere. Please let me know if you have additional questions.

## APPENDIX D. Praxis II™ Results Reporting Form

**Praxis II Results  
Reporting Form  
IDESTE Study  
April 25, 2006**

You can write your Praxis II scores on this form or can run a copy of your results sheet to include in your study response envelope.

<b>Praxis II Scores</b>			
	1 <sup>st</sup> Time Taken	2 <sup>nd</sup> Time Taken (if appropriate)	3 <sup>rd</sup> Time Taken (if appropriate)
Pedagogy			
Content Area 1 (fill in):			
Area 2:			
Area 3:			

Indicate Additional content areas tested as needed:

I certify that the above information is accurate

Subject's Name (printed) \_\_\_\_\_

\_\_\_\_\_  
(Subject's Signature)

\_\_\_\_\_  
(Date)



APPENDIX E. Federal NCLB Highly Qualified Teacher guidance from the Iowa Department of Education

**Iowa Criteria  
For Meeting the NCLB Requirements  
For Highly Qualified Teachers  
Or  
HOUSSE  
(High Objective Uniform State Standard of Evaluation)**

All Iowa teachers must meet requirements of the Iowa Administrative Code for their specific teaching assignment. No teacher may be employed by a school district unless they hold a beginning or standard license to teach. Iowa does not grant emergency licensure to individuals who have not completed their baccalaureate degree in a State Board of Education approved practitioner preparation program.

To meet NCLB requirements, teachers who were first certified to teach in Iowa on or before June 30, 2002, and who retain a valid license are considered highly qualified in the area of teaching responsibility if they meet the requirements listed below for each level.

These requirements represent the Iowa "High Objective Uniform State Standard of Evaluation" or "HOUSSE" as authorized by the federal program, No Child Left Behind (NCLB).

**Admission and Pre-service Levels:**

To be admitted to a teacher education program in Iowa, an individual must achieve a designated score on a basic skills entrance examination. Each candidate must demonstrate proficiency on rigorous standards and competencies through performance on multiple assessments on content knowledge, professional knowledge, and pedagogy. The assessment system of each teacher preparation institution is part of the approval process of the State Board of Education.

All teachers graduate from Iowa approved teacher preparation programs with a baccalaureate degree and have completed coursework equivalent to a major for the endorsements needed for specific teaching assignments. Each teacher candidate must be recommended by the college and complete a background check in order to obtain an initial license in Iowa.

**Beginning Teacher Level:**

Each beginning teacher must successfully complete a two-year sequential mentoring and induction program based on the eight Iowa Teaching Standards. Standard #2 of the eight standards requires competence in subject matter or content knowledge. Each beginning teacher is also comprehensively evaluated on the Iowa Teaching Standards. The evaluation must be completed by an educator who has completed evaluator training, has demonstrated competence in the area, and is licensed by the Board of Educational Examiners. The beginning teacher must demonstrate competence on the Iowa Teaching Standards as determined by the comprehensive evaluation in order to be recommended for a standard license.

**Career Teacher Level:**

After July 1, 2005, all career teachers, or those who possess a standard license, will be evaluated on the Iowa Teaching Standards. These teachers must continue to demonstrate competence through performance evaluations conducted at least once every three years by a certified evaluator. Career teachers will develop an individual career development plan that is aligned with the district's long-range student learning goals and the Iowa Teaching Standards by July 1, 2005. Each school district must provide access to professional development opportunities. This access is available through the district's career development plan. This plan is included in the district's comprehensive school improvement plan (CSIP) which must be approved by and placed on file with the Iowa Department of Education. This career plan must align with the Iowa Teaching Standards, student achievement goals, and support the development needs of the district's teachers.

The following chart illustrates a delineation of requirements for each level:

*IOWA'S HIGHLY QUALIFIED TEACHERS*

<b>TO BE HIGHLY QUALIFIED, TEACHERS IN CORE ACADEMIC SUBJECTS MUST SATISFY THE FOLLOWING REQUIREMENTS</b>	<b>TEACHERS APPLYING FOR AN INITIAL IOWA LICENSE</b>	<b>CURRENT TEACHERS</b>
A. Degree	Hold a valid baccalaureate degree with an endorsement (equivalent to a major) in specific content areas required for licensure to teach in the state of Iowa.	* Hold a valid baccalaureate degree with an endorsement (equivalent to a major) in specific content areas required for licensure to teach in the state of Iowa.
B. Licensure	State License. All teachers must complete a full academic major or the equivalent for specific content areas required by the state of Iowa. An initial teaching license is issued to all individuals who are new to the profession.	* State License. In order to receive a Standard Teaching License, beginning teachers must participate in a two-year mentoring and induction program and be evaluated by a trained and licensed evaluator who must certify that the teacher is competent on all eight of the Iowa Teaching Standards.  Career teachers (those who have successfully completed

TO BE HIGHLY QUALIFIED, TEACHERS IN CORE ACADEMIC SUBJECTS MUST SATISFY THE FOLLOWING REQUIREMENTS	TEACHERS APPLYING FOR AN INITIAL IOWA LICENSE	CURRENT TEACHERS
		<p>their first two years of teaching) must complete six units of continued training to renew their license to teach. These units may be gained through approved professional development programs that emphasize research-based strategies.</p>
<p>C. Subject Matter Competency</p>	<p>1. Complete an Iowa approved practitioner preparation program that requires candidates to:</p> <ul style="list-style-type: none"> <li>a) Pass a standardized, test on Language Arts and Math as a condition for pre-admission to a teacher education program.****</li> <li>b) Complete at least one teaching area major or the equivalent.***</li> <li>c) Complete a rigorous performance based preparation program that uses multiple assessments to verify competence in: <ul style="list-style-type: none"> <li>(1) Subject matter knowledge at the appropriate level*</li> <li>(2) Pedagogical knowledge at the appropriate level</li> <li>(3) Ability to apply knowledge of content and pedagogy to practice at the appropriate level**</li> </ul> </li> <li>d) Complete a criminal background check.</li> <li>e) Receive higher education institutions' recommendation for state licensure.</li> </ul> <p style="text-align: center;">OR</p>	<p>1. Beginning Teachers (1<sup>st</sup> and 2<sup>nd</sup> year)</p> <ul style="list-style-type: none"> <li>a) Mentoring and Induction: Complete a state approved two-year, sequential mentoring program based on the Iowa Teaching Standards. Iowa Teaching Standard #2 focuses on subject matter content knowledge.</li> <li>b) Evaluation by Approved Teacher Evaluators: Trained and state licensed evaluators evaluate all beginning teachers on the Iowa Teaching Standards. Iowa Teaching Standard #2 focuses on subject matter content knowledge.</li> </ul> <p style="text-align: center;">OR</p> <p>2. Career Teachers (more than two years of teaching):</p> <ul style="list-style-type: none"> <li>a) Evaluation by Approved Teacher Evaluators by July 2005, career teachers will be evaluated on the Iowa Teaching Standards. Iowa Standard #2 focuses on subject matter content. Evaluations must be conducted by trained and Iowa licensed evaluators.</li> </ul>

TO BE HIGHLY QUALIFIED, TEACHERS IN CORE ACADEMIC SUBJECTS MUST SATISFY THE FOLLOWING REQUIREMENTS	TEACHERS APPLYING FOR AN INITIAL IOWA LICENSE	CURRENT TEACHERS
	<ol style="list-style-type: none"> <li>1. Complete an out-of-state practitioner program, and</li> <li>2. Receive out-of-state licensure/certification, and</li> <li>3. Meet any Iowa standards that are deficient with the out-of-state preparation and/or licensure.</li> </ol>	<p>b) Career Development Plans: Beginning in July 2005, career teachers will develop individual career development plans that are aligned with the district's long-range student learning goals and the Iowa Teaching Standards. Iowa Standard #2 focuses on subject matter content.</p> <p>Additionally, each district must include a career development plan in their CSIP. This plan must be aligned with the Iowa Teaching Standards (Standard #2 focuses on subject matter content knowledge), student achievement goals, and the needs of the district's teachers. The Iowa Department of Education must approve the district CSIP plans.</p>

\*Institutions use a wide variety of procedures and instruments to assess subject matter content knowledge. Examples include: cumulative grade point average, grade point average in the major and/or in the professional education core, unit and lesson plans, required portfolio contents, recommendations by subject area faculty, evaluations by cooperating teachers during field experiences and/or student teaching, etc.

\*\*The ability to apply knowledge of content and pedagogy to practice is assessed during multiple field experiences (a minimum of 50 clock hours prior to student teaching) plus a minimum of a full semester of student teaching.

\*\*\*The equivalent of a major is defined by the state licensure rules for adding an endorsement. In most cases, the endorsement requires a minimum of 24 hours.

\*\*\*\*Pre-admission basic skills test: Each institution must administer a standardized test that assesses candidates basic skills (at least language arts and math). Many institutions use the PRAXIS I test. Candidates must meet or exceed the minimum cutoff score in order to be admitted to a teacher preparation program. Admission is denied to any candidate who does not meet the required score.

NOTE: Iowa teachers are licensed at one of the following levels: early childhood, elementary, or secondary. Middle school teachers complete the middle school endorsement that must be added to either an elementary or a secondary level license.

## APPENDIX F. INTASC Standards

## INTASC STANDARDS

### (Interstate New Teacher Assessment and Support Consortium)

Principle 1: The teacher candidate understands the central concepts, tools of inquiry, and structures of the discipline he or she teaches and can create learning experiences that make these aspects of subject matter meaningful to students.

Principle 2: The teacher candidate understands how students learn and develop and can provide learning opportunities that support a student's intellectual, social, and personal development.

Principle 3: The teacher candidate understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to diverse learners.

Principle 4: The teacher candidate understands and uses a variety of instructional strategies to encourage student development of critical thinking, problem solving, and performance skills.

Principle 5: The teacher candidate uses an understanding of individual and group motivation and behavior to create a learning environment that encourage positive social interaction, active engagement in learning, and self-motivation.

Principle 6: The teacher candidate uses knowledge of effective verbal, non-verbal and media communication techniques and appropriate technology to foster active inquiry, collaboration, and supportive interaction in the classroom.

Principle 7: The teacher candidate plans instruction based upon knowledge of subject matter, state and national standards, students, and the community.

Principle 8: The teacher candidate understands and uses formal and informal assessment strategies, consistent with instructional goals, to evaluate and ensure the continuous intellectual, social, and physical development of the learner.

Principle 9: The teacher candidate is a reflective practitioner who continually evaluates the effects of his or her choices and actions on others (students, parents, and other professionals in the learning community) and who actively seeks out opportunities to grow professionally.

Principle 10: The teacher candidate fosters relationships with school colleagues, parents, and agencies in the larger community to support student learning and well being.

## APPENDIX G. Letter to Cooperating Teachers on the IDESTE administration

August 2, 2005

Dear Cooperating Teacher,

You are to be commended for assuming the extra work and responsibility required to mentor a student teacher. Your role is key in the professional development of the teacher candidate with whom you share your classroom and your students.

As you may know, Iowa is one of very few states that do not require a “teacher test” for licensure. The Iowa Department of Education (DE) believes that the system of multiple assessments used by Iowa teacher preparation programs is better able to determine the success of a teacher candidate than is a single test. Cooperating teachers have always been part of that multiple assessment process.

The U.S. Department of Education currently requires a statewide assessment of teacher candidates. In lieu of a statewide test, the Iowa DE is piloting a statewide evaluation of student teachers. You will be asked to complete an evaluation of your student teacher at the end of his/her placement. The evaluation will be collected by the college/university supervisor at the final conference and will be forwarded to the Iowa Department of Education.

These evaluations will be confidential. The information collected at the state level will not use student names, but will give us a better picture of the strengths and areas for focus among our student teachers across the state. Individual programs will be able to use this information as well, either as their own student teacher assessment or in addition to their own assessments.

As you complete this evaluation, please keep in mind the following:

- 1) You are evaluating the candidate according to the standards as a student teacher, not as a new teacher, although an exemplary student teacher may look like a new or even somewhat experienced teacher.
- 2) Within the 5-point rating scale, the Met/Acceptable heading has a 3-point range, allowing you to more accurately evaluate student teachers who may be “a little stronger” or “a little weaker” than Acceptable.
- 3) An honest evaluation is the best evaluation . . . for everyone in the long run.

You will recognize the Iowa Teaching Standards in the left column of the assessment tool. These have been aligned with national standards for teacher preparation, the INTASC Standards. For reference you will find the INTASC standards on the back of this letter.

If you have questions, please contact your college/university supervisor.

Thank you for providing this important information and for partnering with a teacher preparation program as we all work together to provide P-12 students with the best new teachers possible.

Arlie Willems, Practitioner Preparation



Appending H – Instructions to cooperating teachers on how to administer the IDESTE

TO: Chairs of Practitioner Preparation Programs  
 FROM: Arlie Willems, Practitioner Preparation, Iowa DE  
 RE: Instructions for Student Teacher Assessment Tool  
 DATE: August 1, 2005

As was mentioned at IACTE in the spring and is explained in the accompanying letter, the U.S. Department of Education (U.S.D.E.) is requiring a state assessment of new teacher candidates. Attached is the pilot assessment tool that Iowa will use in place of a test. Additionally, in the near future, I will be sending you a request for information about your candidates; it will be data that should not be difficult for you to provide.

My thanks to Jackie Crawford for the concept and initial draft of the assessment tool. Thanks as well to a great committee that met on short notice this summer so that we could complete this in time for your cooperating teacher workshops. The committee: Barry Wilson, Phil George, Henry Pitman, Mary Jean Jeanae, Robin White, Tom Andre, Susan Fischer, Mary Beth Schroeder Fracek, Sue Swartz, and Jackie Crawford.

For this year, the assessments will be via paper. Funding from the grant will allow us to put the assessment document into electronic form for future ease of use.

You will note that this assessment is based on the INTASC Standards and incorporates the Iowa Teaching Standards. You may use this as your institutional assessment of student teachers, if you choose. If you do so, you are welcome to make additions, but not deletions or significant changes. Because of the need for statewide reporting, it is important that this document maintain its consistency.

Many of you will use this assessment in addition to your own assessment. We realize that this is asking extra work of cooperating teachers, but the similarity of content between the two assessments should make it reasonable.

We are asking you to have an assessment completed for EACH placement for each student teacher. Those with a single 16-week placement will have only one assessment.

This is what we need to have you do:

- 1) Make copies of the assessment tool on LEGAL-SIZE paper. The state will require one copy of this form. If you wish, you may use duplicate forms or make copies for your own use (e.g. institution files, supervisor, cooperating teacher, student teacher).
- 2) Make copies of the letter to cooperating teachers. Be sure to include the INTASC Standards on the back.
- 3) Familiarize your student teaching supervisors with the assessment tool and the letter. Please make sure that they have talked through all of the documents so that they have a clear understanding. Especially note that:

- The first standard, Content Knowledge, has two options: Option 1 for elementary/early childhood/special education is an entire page because it addresses the four major content areas individually; Option 2 is to be used for secondary and other areas (music, art, physical education, etc.).
  - A column for Not Observed (N) is found only on page 1. This is to accommodate elementary, early childhood, or special education placements that do not provide the opportunity for student teachers to teach all four of the core areas. Standards 2 through 10 should be observable in all placements.
  - For each of Standards 2 through 10, be sure that cooperating teachers mark only one box per standard.
- 4) Have your student teaching supervisors introduce this to cooperating teachers and answer questions that they may have. Of course, you may introduce this at your Cooperating Teacher Workshop(s) as well.
  - 5) During the last visit of the placement, have the supervisor collect the assessment.
  - 6) At that time, make or collect (if on duplicate form) your copy, have the cooperating teacher place the copy in an envelope (It may be folded.), seal the envelope, and ask the cooperating teacher to sign over the seal. (In this way, we are assuring the U.S.D.E. that the information is coming directly to the state.)
  - 7) Collect all of the documents. Please keep a record so that the return is 100%. Send the documents together (at the end of each 9-weeks) to:

Arlie Willems, Practitioner Preparation  
Iowa Department of Education  
Grimes State Office Building  
Des Moines, IA 50319-0146

The information that we gather will be helpful to us, in addition to fulfilling the federal requirements. The data will not be used for comparison of programs. Any comparisons made will be concerning how well the different standards are being met. Through the grant, the plan is to implement a way that you can access your student teachers' information so that you don't have to input all the data on your student teachers in order to have aggregated information.

Questions?

My number is 515-281-3427. E-mail is [arlie.willems@iowa.gov](mailto:arlie.willems@iowa.gov). Also, I will be available to review this process with you at the Fall IACTE meeting.

Thanks so much for your cooperation on this endeavor.

APPENDIX I. IDESTE Assessment Instrument

IOWA DEPARTMENT OF EDUCATION STUDENT TEACHER EVALUATION



College or University: \_\_\_\_\_ Date: \_\_\_\_\_ Student Teacher Name: \_\_\_\_\_  
 Content Area(s): \_\_\_\_\_ Student Teacher Signature (optional): \_\_\_\_\_  
 Date: Length of Placement: (weeks) \_\_\_\_\_ Grade Level of Placement: \_\_\_\_\_ Cooperating Teacher Signature: \_\_\_\_\_

Standards	Rate the candidate on each of the 10 standards by marking the appropriate box on the 1-5 scale.	1 Not met/Unacceptable	2	3 Met/Acceptable	4	5 Met with Strength/Excellent	Not Observed
<p><b>1.a. Content Knowledge</b></p> <p><b>Option 1: Elementary/ Early Childhood K-6 Special Education</b></p> <p>IND ASG Principle 1: <u>Knowledge of Subject Matter</u> Candidates:  <ul style="list-style-type: none"> <li>Understands subject matter.</li> <li>Creates learning experiences that make subject matter meaningful to students.</li> </ul> </p> <p><b>Iowa Teaching Standard #2. Demonstrates competence in content knowledge appropriate to the teaching position.</b></p> <p><b>Possible Sources of Evidence:</b>                      Lesson plans                      Lessons observed                      Revised lesson plans                      Artifacts of student learning</p>	<p><b>Indicators for Consideration</b></p> <p><u>Reading/Literacy/Language Arts</u>                      As appropriate for the developmental level of the students, the candidate knows, understands, and uses concepts from reading, language, and child development to teach reading, writing, speaking, viewing, listening, thinking skills, and to help students successfully apply their developing skills to many different situations, materials, and ideas.</p> <p><u>Math</u>                      As appropriate for the developmental level of the students, the candidate knows, understands, and uses the major concepts, procedures, and reasoning processes in the areas of mathematics in the areas of operations and number sense, geometry, measurement, data analysis and probability, and algebra. Candidate fosters conceptual understanding and use of patterns, identifies special relationships, and problem-solving.</p> <p><u>Science</u>                      As appropriate for the developmental level of the</p>	<p><u>Reading/Literacy/Language Arts</u>  <input type="checkbox"/></p> <p><u>Math</u>  <input type="checkbox"/></p> <p><u>Science</u>  <input type="checkbox"/></p> <p><u>Social Studies</u>  <input type="checkbox"/></p>	<p><u>Reading/Literacy/Language Arts</u>  <input type="checkbox"/></p> <p><u>Math</u>  <input type="checkbox"/></p> <p><u>Science</u>  <input type="checkbox"/></p> <p><u>Social Studies</u>  <input type="checkbox"/></p>	<p><u>Reading/Literacy/Language Arts</u>  <input type="checkbox"/></p> <p><u>Math</u>  <input type="checkbox"/></p> <p><u>Science</u>  <input type="checkbox"/></p> <p><u>Social Studies</u>  <input type="checkbox"/></p>	<p><u>Reading/Literacy/Language Arts</u>  <input type="checkbox"/></p> <p><u>Math</u>  <input type="checkbox"/></p> <p><u>Science</u>  <input type="checkbox"/></p> <p><u>Social Studies</u>  <input type="checkbox"/></p>	<p><u>Reading/Literacy/Language Arts</u>  <input type="checkbox"/></p> <p><u>Math</u>  <input type="checkbox"/></p> <p><u>Science</u>  <input type="checkbox"/></p> <p><u>Social Studies</u>  <input type="checkbox"/></p>	<p><u>Reading/Literacy/Language Arts</u>  <input type="checkbox"/></p> <p><u>Math</u>  <input type="checkbox"/></p> <p><u>Science</u>  <input type="checkbox"/></p> <p><u>Social Studies</u>  <input type="checkbox"/></p>
		<p><u>Rubric for all Subjects</u>                      Exhibits misunderstanding or lack of knowledge of instructional content.</p> <p>• Prepares instructional plans that lack effective steps for promoting meaningful learning of the</p>	<p><u>Rubric for all Subjects</u>                      Is able to discuss and present instructional content accurately and with evidence of solid understanding.</p> <p>• Typically creates instructional plans that incorporate effective steps for promoting meaningful learning</p>	<p><u>Rubric for all Subjects</u>                      Consistently discusses and presents instructional content accurately and with evidence of solid understanding. Is able to elaborate and pertinent</p>			

## IOWA DEPARTMENT OF EDUCATION STUDENT TEACHER EVALUATION

<p>work Teacher materials (handouts, tapes, etc.) Conferences with candidate Informal observations</p>	<p>students, the candidate knows, understands, and uses fundamental concepts in the areas of physical, life, and/or earth and space sciences, as determined by the building science curricula. Candidate engages students in the science inquiry process, introduces them to understandings about science and technology, and helps students understand the natural world. <u>Social Studies</u> <b>As appropriate for the developmental level of the students,</b> the candidate knows, understands, and uses the major concepts and processes of inquiry from the social studies. The candidate integrates age-appropriate studies of history, geography, the social sciences and other related areas to promote the development of students' abilities to make informed decisions as future citizens of a culturally diverse democratic society and interdependent world.</p>	<p>subject matter by students.</p> <ul style="list-style-type: none"> <li>Shows minimal interest in updating or extending personal subject matter knowledge for specific aspects of the teaching assignment.</li> <li>Exhibits minimal interest in the subject matter or in teaching the assigned subject.</li> </ul>	<p>of the subject matter by students.</p> <ul style="list-style-type: none"> <li>Shows will ingress to update or extend personal subject matter knowledge for specific aspects of the teaching assignment, as needed.</li> <li>Models interest in the subject matter and commitment to teaching the assigned subject.</li> </ul>	<p>information/examples in addition to what is in the lesson plans and/or teachers' manuals.</p> <ul style="list-style-type: none"> <li>Creates instructional plans that consistently incorporate effective steps for promoting meaningful learning of the subject matter by students.</li> <li>Shows initiative in updating or extending personal subject matter knowledge for specific aspects of the teaching assignment.</li> <li>Is able to elicit student interest in the subject matter, exhibits enthusiasm in teaching the assigned subject, and contributes to discussions and work with colleagues.</li> </ul>
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IOWA DEPARTMENT OF EDUCATION STUDENT TEACHER EVALUATION

Comments:		1	2	3	4	5	1.a. Content Knowledge
		Not met/Unacceptable	Met/Acceptable	Met/Acceptable	Met/Acceptable	Met with Strength/Exemplary	1.a. Content Knowledge
<p><b>1.b. Content Knowledge</b></p> <p><b>Option 2:</b> Teachers other than those in <b>Option 1</b> (e.g., All Secondary, K-6 Art, 7-12 Art, K-6 Music, 7-12 Music, K-6 Physical Education, 7-12 Physical Education, Elementary Spanish)</p> <p><b>INTASC Principle 1: Knowledge of Subject Matter</b></p> <p><b>Candidate:</b></p> <ul style="list-style-type: none"> <li>• Understands subject matter.</li> <li>• Creates learning experiences that make subject matter meaningful to students.</li> </ul> <p><b>Iowa Teaching Standard #2: Demonstrates competence in content knowledge appropriate to the teaching position.</b></p> <p><b>Possible Sources of Evidence:</b></p> <ul style="list-style-type: none"> <li>• Lesson plans</li> <li>• Lessons observed</li> <li>• Revised lesson plans</li> <li>• Artifacts of student</li> </ul>	<p><b>Indicators for Consideration</b></p> <p><b>Candidate:</b></p> <ul style="list-style-type: none"> <li>• Exhibits knowledge of important concepts and principles within the discipline/subject field</li> <li>• Demonstrates knowledge of skills and procedures pertinent to the discipline (e.g., lab procedures, use of spreadsheets for business).</li> <li>• Exhibits ability to discuss issues/trends related to the specific field of knowledge.</li> <li>• Shows interest in the professional field (attending conferences, reading current literature).</li> </ul>	<p><b>Not met/Unacceptable</b></p> <p>Exhibits misunderstanding or lack of knowledge of instructional content.</p> <p>Prepares instructional plans that lack effective steps for promoting meaningful learning of the subject matter by students.</p> <p>Shows minimal interest in updating or extending personal subject matter knowledge for specific aspects of the teaching assignment.</p> <p>Exhibits minimal interest in the subject matter or in teaching the assigned subject.</p>	<p><b>Met/Acceptable</b></p> <p>Is able to discuss and present instructional content accurately and with evidence of solid understanding.</p> <p>Creates instructional plans that consistently incorporate effective steps for promoting meaningful learning of the subject matter by students.</p> <p>Shows initiative in updating or extending personal subject matter knowledge for specific aspects of the teaching assignment, as needed.</p> <p>Models interest in the subject matter and commitment to</p>	<p><b>Met with Strength/Exemplary</b></p> <p>Consistently discusses and presents instructional content accurately and with evidence of solid understanding. Is able to elaborate and include pertinent information/examples in addition to what is in the lesson plans and/or teachers' manuals.</p> <p>Creates instructional plans that consistently incorporate effective steps for promoting meaningful learning of the subject matter by students.</p> <p>Shows initiative in updating or extending personal subject matter knowledge for specific aspects of the teaching assignment.</p> <p>Is able to elicit student interest in the subject matter, exhibits enthusiasm in teaching</p>	1.a. Content Knowledge		

IOWA DEPARTMENT OF EDUCATION STUDENT TEACHER EVALUATION

<p>work                  Teacher materials                  (handouts, tests,                  etc.)                  Conferences with                  candidate                  Informal observations</p>	<p>teaching the                  assigned subject.</p>	<p>1.c assigned subject, and                  contributes to                  discussions and work                  with colleagues.</p>
<p>Comments:</p>		<p>1.b                  Content                  Knowledge</p>

Note: The additional sections of the IDESTE that did not pertain to this dissertation study were removed from this appendix.



## APPENDIX J. Internal Review Board Human Subjects Study Approval

IOWA STATE UNIVERSITY  
OF SCIENCE AND TECHNOLOGY

January 4, 2006

Jeff Berger  
4209 Pommel Pl.  
West Des Moines, IA 50265

Institutional Review Board  
Office of Research Assurances  
Vice Provost for Research  
1138 Pearson Hall  
Ames, Iowa 50011-2207  
515 294-4566  
FAX 515 294-4267

Dear Mr Berger,

Approval Date: January 3, 2006      Date for Continuing Review: January 2, 2007

The Institutional Review Board Chair of Iowa State University reviewed and approved the protocol entitled: The validity and reliability of the Iowa Department of Education Student Teacher Evaluation (IDESTE) in measuring the quality of content preparation of post-secondary teacher candidates participating in student teaching experiences during the fall of 2005, on January 3, 2006. The protocol has been assigned the following ID Number: 05-590. Please refer to this number in all correspondence regarding the protocol

**Your study has been approved for a period of one year from January 3, 2006 to January 2, 2007. The continuation review for this study is no later than January 2, 2007.** As a courtesy to you, you will receive a reminder of the approaching review date approximately one month prior this date. A continuing review form must be submitted with sufficient time prior to this date for the IRB to review and approve continuation of the study. Failure to complete and submit the continuing review form will result in expiration of IRB approval on the continuing review date and the file will be administratively closed. A new application for IRB approval will be required to reactivate the study. In addition, all research related activities involving the participants must stop on the continuing review date, until approval can be re-established, except when necessary to eliminate immediate hazard to research participants.

**Any changes in the protocol or consent form** may not be implemented without prior IRB review and approval, using the "Continuing Review and/or Modification." Research investigators are expected to comply with the principles of the Belmont Report, and state and federal regulations regarding the involvement of humans in research. These documents are located on the Office of Research Assurances website or available by calling (515) 294-4566, [www.compliance.iastate.edu](http://www.compliance.iastate.edu).

You must promptly report any of the following to the IRB: (1) **all serious and/or unexpected adverse experiences** involving risks to subjects or others; and (2) **any other unanticipated problems involving risks** to subjects or others.

Upon completion of the project, a Project Closure Form should be submitted to the Human Subjects Research Office to officially close the project.

Sincerely,

Dianne Anderson  
IRB Co-Chair

C: Mack Shelley  
ELPS

## INFORMED CONSENT DOCUMENT

**Title of Study:**     **The validity and reliability of the pilot Iowa Department of Education Student Teacher Evaluation (IDESTE) at measuring the quality of content area preparation of teacher candidates participating in student teaching during the fall of 2005.**

**Investigator:**     **Jeff Berger, B.S., M.S.E., Ed.S. and Ph.D. candidate**

This is a research study. Please take your time in deciding if you would like to participate. Please feel free to ask questions at any time.

### *INTRODUCTION*

The purpose of this study is to determine the effectiveness of the pilot IDESTE at measuring the quality of content area preparation for teacher candidates in Iowa. The IDESTE will assess the quality of your content area preparation in four areas (if you are an elementary education candidate): 1) Reading/Literacy/Language Arts, 2) Mathematics, 3) Science, and 4) Social Studies. If you are a high school candidate, you will be assessed in the area(s) of potential endorsement. You are being invited to participate in this study because you participated in student teaching during the fall of 2005.

### *DESCRIPTION OF PROCEDURES*

If you agree to participate in this study, your participation will consist of allowing the Department of Education to access, through your post-secondary institution, four pieces of information (if available): 1) your ACT/SAT scores prior to entering college, 2) your current transcript, 3) your Praxis I scores, and 4) your Praxis II scores (if you took the assessment). No other information or contact with you is necessary for the Department to complete this study of the IDESTE instrument. You always have the option to not participate in this study.

### *RISKS*

There are no known or foreseeable individual risks at this time from your participation in this study. There is no possibility of any action or result for you individually as a result of participation.

### *BENEFITS*

If you decide to participate in this study, there will also be no direct benefit to you. It is hoped that the information gained in this study will benefit society by determining whether the IDESTE instrument is an effective and efficient way of assessing the content knowledge of teacher candidates in the State of Iowa. The Department of Education believes the current system of



teacher preparation in Iowa more than adequately prepares teacher candidates to enter the teaching profession and believes that the addition of an external, standardized assessment, like the Praxis II®, would have no value added in the current system. This study would save the State of Iowa and its higher education institutions a substantial amount of resources (time, personnel, and funding) if the IDESTE can be shown to be valid and reliable. Iowa also would be able to demonstrate compliance with federal NCLB statutes, specifically the highly qualified teacher provisions. Iowa's teacher candidates also would have the State's assurance that they were adequately prepared to enter the teaching profession in any other state.

### *COSTS AND COMPENSATION*

You will not have any costs from participating in this study. You will not be compensated for participating in this study.

### *PARTICIPANT RIGHTS*

**Your participation in this study is completely voluntary and you may refuse to participate or leave the study at any time. If you decide to not participate in the study or leave the study early, it will not result in any penalty or loss of benefits to which you are otherwise entitled.**

### *CONFIDENTIALITY*

Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal or state government regulatory agencies (e.g., the US Department of Education, the Iowa Department of Education) and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information.

To ensure confidentiality to the extent permitted by law, your records will be accessed only by the principal investigator, clerical staff providing data entry, and the two co-leaders of the overall grant effort under which the study is being conducted. Paper copies will be kept in a locked storage unit at all times. Electronic data will be housed in the DE's data management system, which exceeds all state and federal guidelines for electronic storage, access, and confidentiality. If the results are published, your identity will remain confidential.

### *QUESTIONS OR PROBLEMS*

You are encouraged to ask questions at any time during this study.

- For further information about the study contact, please contact Jeff Berger at 515-281-3399 or [jeff.berger@iowa.gov](mailto:jeff.berger@iowa.gov). You may also contact Jeff's major professor, Dr. Mack

Shelley at E005 Lagomarcino, Ames, IA 50311, (515) 294-9282 or [mshelley@iastate.edu](mailto:mshelley@iastate.edu) for additional information regarding the study.

- If you have any questions about the rights of research subjects or research-related injury, please contact Ginny Austin Eason, IRB Administrator, (515) 294-4566, [austingr@iastate.edu](mailto:austingr@iastate.edu), or Diane Ament, Director, Office of Research Assurances (515) 294-3115, [dament@iastate.edu](mailto:dament@iastate.edu).

\*\*\*\*\*

*SUBJECT SIGNATURE*

Your signature indicates that you voluntarily agree to participate in this study, that the study has been explained to you, that you have been given the time to read the document and that your questions have been answered satisfactorily. You will receive a copy of the signed and dated written informed consent prior to your participation in the study.

Subject's Name (printed) \_\_\_\_\_

\_\_\_\_\_  
(Subject's Signature)

\_\_\_\_\_  
(Date)

*INVESTIGATOR STATEMENT*

I certify that the participant has been given adequate time to read and learn about the study and all of his/her questions have been answered. It is my opinion that the participant understands the purpose, risks, and benefits, and the procedures that will be followed in this study, and has agreed voluntarily to participate.

---

(Signature of Person Obtaining  
Informed Consent)

---

(Date)

## APPENDIX L. Letter to accredited teacher preparation programs explaining the study

To: Chairs, Accredited Teacher Preparation Programs

From: Judy Jeffrey  
Arlie Willems  
Jeff Berger

Subject: Study of IDESTE

Date: January 24, 2006

By now, you are well aware of Iowa's efforts to ensure the federal Department of Education that our preservice teachers are meeting Highly Qualified teacher provisions under NCLB statute. To that end, the Iowa Department of Education, in collaboration with representatives from accredited teacher preparation programs, developed the Iowa Department of Education Student Teacher Evaluation (IDESTE) to assess student teachers' performance against the Iowa Teaching Standards and specifically Standard 2 related to content knowledge.

Jeff Berger, the Department's legislative liaison, has accepted the challenge to analyze the performance of this survey as his dissertation study through Iowa State University. This study will assess the validity and reliability of the IDESTE and will compare the content knowledge results of the IDESTE with several other standard measures of content knowledge. The basic assumption being tested by this study is whether the measurement of content knowledge by the IDESTE is roughly equivalent to other measures of content knowledge like the ACT/SAT, grade point average in content area courses, the Praxis I™, and Praxis II™. We still have hope that if the IDESTE proves equal to some or all of these other measures, that the State of Iowa can avoid the expense and additional burden of requiring the Praxis II™ as a condition of initial licensure. **We still believe that Iowa's teacher preparation system is second to none and that a student teacher's cooperating teacher is a better overall judge of the depth and breadth of a student teacher's content knowledge than a single event standardized test.**

To adequately complete this study on the timeline required by the US Department of Education, we need your help. The Iowa Department of Education required the cooperating teacher of every student teacher during the fall of 2005 to complete an IDESTE. We also know many student teachers in Iowa voluntarily complete a Praxis II™ exam.

This study will focus **ONLY** on **preservice teachers seeking elementary education endorsements who participated in student teaching during the fall of 2005 and who also voluntarily completed a Praxis II exam™**. We realize that you may not have record of the Praxis II™ exams scores, but ask your assistance in helping us obtain the following information:

- SAT/ACT score (if available)
- Cumulative GPA to date
- All available Praxis I™, C-BASE, or CAAP exam scores
- Praxis II™ content and pedagogy exam scores

We would ask that you use the following steps as you assist us with this process:

1. Please forward attachments 2, 3, and 4 to all fall 2005 student teachers we are/were seeking an elementary education endorsement. Attachments 2, 3, and 4 are as follows:
  - Attachment 2: Brief letter from Arlie Willems explaining purpose of the study
  - Attachment 3: Letter from Jeff Berger explaining the parameters of the study and to grant permission to include them in the study.
  - Attachment 4: Permission slip that allows the institution to release the requested data.
2. Student will submit the study approval form, data release permission slip, and Praxis II scores™ to Linda Choate at the Department.
3. The Department will send institutions copies of data release forms.
4. The institution will provide the requested data by [due date] to:
  - Linda Choate
  - IDESTE Study
  - Iowa Department of Education
  - Grimes Building
  - Des Moines, IA 50319

Please address any additional questions to Jeff Berger (phone, email) or Arlie Willems (phone, email). Thank you for your assistance with this study.

## APPENDIX M. IDESTE Praxis II™ Reminder Letter to student teachers

TO: College students/graduates who student taught during 2006

FROM: Jeff Berger, ISU PhD candidate and Department of Education  
Legislation Liaison

RE: Research study of the Iowa Department of Education Student Teaching Evaluation (IDESTE)

DATE: June 8, 2006

Earlier this spring, you were invited to participate in a study by the Department regarding the Iowa Department of Education Student Teacher Evaluation (IDESTE). The IDESTE survey was completed by your cooperating teacher near the end of your student teaching experience.

The purpose of the study is to compare the results of the IDESTE with other standard methods of measuring your knowledge of content by comparing the IDESTE results with other measures like grade point average, ACT/SAT scores, Praxis I/C-BASE/CAAP scores, and Praxis II scores.

We still need your help. If you are/were pursuing 1) an elementary teaching endorsement and 2) took the Praxis II exam, we encourage you again to grant us permission to confidentially access information that will allow us to complete this study. We currently do not have enough voluntary participation by those who took the Praxis II to complete the Praxis II portion of this study.

If you are willing to participate, please email me at [jeff.berger@iowa.gov](mailto:jeff.berger@iowa.gov) or call me at 515-281-3399, and I will send you a packet of information and consent forms. If you still have the materials previously sent to you, they are still current and can be used.

Please be assured that we are only examining aggregate group data with this study. Your individual participation will be kept confidential, any data used will be stripped of any identifying information, and all data accessed by me through this process will be properly disposed of at the completion of the study.

Thanks again for your consideration and I hope you will consider participating. Please contact me with any questions or concerns.

APPENDIX N. Letter to accredited teacher preparation programs requesting additional subsample data

To: Chairs, Accredited Teacher Preparation Programs

From: Judy Jeffrey  
Arlie Willems  
Jeff Berger

Subject: Department Study of IDESTE results

Date: July 26, 2006

In January, you were made aware that the Iowa Department of Education intended to compare the quality of information provided on the IDESTE with other measures of student performance. That study continues. Over the course of 2005-06, just under 1600 pre-service students seeking elementary education endorsements completed student teaching. The cooperating teachers supervising these students completed an IDESTE for each of these students as well. Thank you for your efforts and support – you ensured that this system was quickly and effectively implemented.

The recent adjustment to Iowa's NCLB Accountability Plan requires Iowa to implement the Praxis II for elementary student teachers for the next two years. However, the plan submitted to the US Department of Education (USDE) included the Praxis requirement as an interim measure while Iowa continues to work with the USDE to demonstrate that the IDESTE assessment is as effective as other measures of student performance at measuring, among other things, the quality of content knowledge of preservice teachers. To that end, the Department's IDESTE study compares IDESTE results to other measures of student content knowledge and requires the Department to collect additional information on a sample of students statewide who were evaluated using the IDESTE during the 2005-2006 school year.

Of the nearly 1600 students seeking elementary endorsements who completed student teaching during 2005-06, we selected a sample of around 300 students for this study. Apologies in advance for any misspellings or confusion with the names on the list – we took those names from handwritten IDESTEs and did the best we could.

The randomly selected students from your program are attached. We are asking you to send us the following information on each of these students who graduated from your program:

1. ACT or SAT scores including cumulative and subtest scores
2. Cumulative GPA (most current)
3. Results, including total and subtests, from the exam used prior to entry into the teacher preparation program (Praxis I, C-Base, CAPE).

As a reminder, since the Iowa Department of Education is the accrediting agency for teacher preparation programs in Iowa, this type of information exchange is permissible. The Department ensures that complete confidentiality applies to the data provided, no individual results will be released, and that the data provided will be destroyed upon completion of the study. These data

will allow the Department to correlate IDESTE results with other preexisting student performance data.

If you elect to submit this information electronically, please send this information to [jeff.berger@iowa.gov](mailto:jeff.berger@iowa.gov) by **Friday, September 1, 2006**. If you elect to send the information on hard copy, please mail it using the same deadline to Jeff Berger, Grimes State Office Building, Des Moines, IA 50319. If you have additional questions, please contact Jeff Berger at 515-281-3399.

Thanks again for your cooperation and support.



APPENDIX O. Internal Review Board Stamped Approval Sheet

Review Date: <u>11/21/05</u> Approval Date: <u>11/31/05</u> Approval Expiration Date: <u>12/1/06</u> EXEMPT per 45 CFR 46.101(b) _____ EXPEDITED per 45 CFR 46.110(b) <u>5</u> Category: _____	IRB ID: <u>05-590</u> Length of Approval: <u>1yr</u> FULL Committee Review: _____ Minimal Risk: <u>/</u> More than Minimal Risk: _____ Project Closed Date: _____
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Approved  
 11/31/05

ISU NEW HUMAN SUBJECTS RESEARCH FORM

IRB  
 DEC 15 2005

SECTION I: GENERAL INFORMATION

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Center/Institute: <u>Iowa State University</u>	College: <u>Human Sciences</u>	
PI Level: <input type="checkbox"/> Faculty <input type="checkbox"/> Staff <input type="checkbox"/> Postdoctoral <input checked="" type="checkbox"/> Graduate Student <input type="checkbox"/> Undergraduate Student		
Title of Project: <u>Dissertation Study</u>		
The validity and reliability of the Iowa Department of Education Student Teacher Evaluation (IDSTE) in measuring the quality of content preparation of post-secondary teacher candidates participating in student teaching experiences during the fall of 2005.		
Project Period (Include Start and End Date): <u>12/1/05 to 12/1/06</u>		

FOR STUDENT PROJECTS

Name of Major Professor/Supervising Faculty: <u>Dr. Mack Shelley</u>	Signature of Major Professor/Supervising Faculty: <u>Mack Shelley</u>
Phone: <u>515-294-9282</u>	Campus Address: <u>E005 Lagoon Arcade</u>
Department: <u>ELPS</u>	Email Address: <u>mshelley@iastate.edu</u>
Type of Project: (check all that apply)	
<input type="checkbox"/> Research <input type="checkbox"/> Thesis <input checked="" type="checkbox"/> Dissertation <input type="checkbox"/> Class project <input type="checkbox"/> Independent Study (490, 590, Honors project) <input type="checkbox"/> Other. Please specify: _____	

KEY PERSONNEL

List all members and relevant experience of the project personnel. This information is intended to inform the committee of the training and background related to the specific procedures that the each person will perform on the project.

NAME & DEGREE(S)	SPECIFIC DUTIES ON PROJECT	TRAINING & EXPERIENCE RELATED TO PROCEDURES PERFORMED, DATE OF TRAINING
<u>Jeff Berger, B.S.; M.S.E.; Ed.S.</u>	<u>Dissertation Study Leader</u>	<u>Certified in Human Subjects training on November 29, 2005.</u>

FUNDING INFORMATION

Internally funded, please provide account number: \_\_\_\_\_

Externally funded, please provide funding source and account number: \_\_\_\_\_

Funding is pending please provide OSPA Record ID or GoldSheet: \_\_\_\_\_

Title on GoldSheet if Different Than Above: \_\_\_\_\_

Research Compliance 04/10/03

## ACKNOWLEDGEMENTS

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Thank you to members of my Program of Study Committee—Dr. Jackie Blount, Dr. Frank Hernandez, Dr. Jim Scharff, and Dr. Veronica Stalker—for the guidance they provided to see me through to the end of this process.

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A great debt of gratitude to fellow Iowa State doctoral students and colleagues Debbie Boring, Tom Cooley, and Jeanette McGreevy for providing a collective and ongoing support system for all of our efforts to complete this doctoral process.

## DISCLAIMER

This document is a product of the personnel doctoral study of Jeff Berger and in no way represents the views or opinions of the Iowa Department of Education. While data collected by the Department of Education were accessed and used for this study, it is independent of any study or summary of these data done by the Iowa Department of Education.