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Documentation of Knox County school system end-of-course test development for automated accounting/spreadsheets

Gregory A. Bruce
University of Tennessee

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To the Graduate Council:

I am submitting herewith a thesis written by Gregory A. Bruce entitled "Documentation of Knox County school system end-of-course test development for automated accounting/spreadsheets." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Human Resource Development.

Vickie Johnson Stout, Major Professor

We have read this thesis and recommend its acceptance:

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

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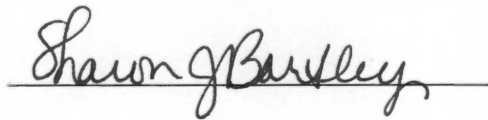
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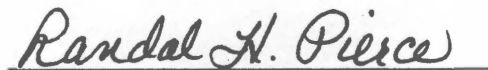
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Accepted for the Council:



Vice Provost and Dean of Graduate
Studies

**Documentation of
Knox County School System
End-of-Course Test Development
for Automated Accounting/Spreadsheets**

**A Thesis Presented for the
Master of Science Degree,
The University of Tennessee, Knoxville**

**Gregory A. Bruce
August 2002**

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2002
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ABSTRACT

The purpose of this study was to document the development of a system-wide end-of-course test for Automated Accounting/Spreadsheets in Knox County, Tennessee. The high school end-of-course test is a 90-minute, written assessment that evaluates the desired course objectives. The Automated Accounting/Spreadsheets end-of-course test was developed by a team of local business education teachers who have the responsibility of teaching this course within their respective high schools. The major findings of the study were as follows: (a) system-wide end-of-course testing in the Automated Accounting/Spreadsheets course targets providing teachers, students, and the public with timely, valid, and reliable information regarding student mastery of the curriculum; (b) the federal, state, and local guidelines, procedures, and timelines direct the collaborative efforts of the Test Development Team responsible for the design and creation of an evaluation tool congruent with national and state standards; (c) the Tennessee standards and competencies addressed in the teaching of the Automated Accounting/Spreadsheets course included seven standards with a range of 2 to 7 sub-standards each for Automated Accounting and six standards with a range of 1 to 7 sub-standards each for Spreadsheet Applications. One standard appears redundantly in both the Automated Accounting and in the Spreadsheet Applications portions of the composite course; standard seven of Automated Accounting and standard six of Spreadsheet Applications pertains to student demonstration of organizational and professional leadership skills; (d) six major procedural steps comprise competency test development, namely, (Step 1) Determine Competency Test Objectives; (Step 2) Choose Format of the Test Questions; (Step 3)

Devise Test and Item Specifications; (Step 4) Write the Test Questions; (Step 5) Review, Evaluate, and Amend the Test Questions; and (Step 6) Conduct Pilot Testing Sessions; (e) the 10 local school system teacher practitioners/subject matter experts responsible for Knox County's Automated Accounting/Spreadsheets course competency test development were chosen because of their knowledge in teaching this course within their respective high schools. A by-product of this study is the aforementioned six procedural steps that make-up competency test development. The six steps represent a systems approach reflective of the input, process, output, feedback, and control processes that are conducive to replication.

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CHAPTER I

Introduction

Why require system-wide, end-of-course testing in Tennessee's secondary-level Automated Accounting/Spreadsheets course? The mission of today's educational community is to improve the potency and effectiveness of the school systems, the schools, and their curricular offerings. The dream of education is to ensure that no student "falls through the cracks," and that each student receives an adequate education. The Automated Accounting/Spreadsheets end-of-course test will be used to assist students, teachers, schools, and parents in knowing (a) what knowledge students have acquired, and (b) what content from this course's material still needs work. End-of-course tests measure how well the students have mastered the skills they have been taught and how prepared the students are for transition to more progressive coursework.

The end-of-course test is designed to assess the curriculum defined within Tennessee's Automated Accounting/Spreadsheets course standards. One of the primary purposes of the Automated Accounting/Spreadsheets end-of-course test is the alignment with the curriculum standards by including content knowledge and critical thinking skills that promote student-learning improvement. A test must tie directly to the standards because instructors are required to design and teach their courses according to these curriculum measurements.

The Tennessee State Department of Education has empowered local schools to either develop their own end-of-course tests or administer the end-of-course tests created by the State. Geff Davis (personal communication, October 19, 2001), Business Teacher

at Gibbs High School and an Automated Accounting/Spreadsheets End-of-Course Test Team member, states, “Our philosophy [at Gibbs High School] is to use the tests as a jump start to better teaching.”

Societal pressures continue to increase for teacher and student accountability. According to the Southern Regional Education Board (SREB) High Schools report (July, 1998), “. . . school performance based on results of [end-of-course] testing programs has become an important and controversial part of state accountability programs.” Meeting the course standards is the responsibility of the teachers, and the end-of-course test is a reflection of whether the teachers are adequately doing their jobs. For example, if a student is failing the class or fails the end-of-course test, the teacher assumes some responsibility for not properly transferring the course information to that student. The teacher may need to change his or her teaching methods to cater to the learning styles of the students. If the students do not understand the initial attempt by the instructor to teach the material, then the instructor may need to develop a different technique or strategy to re-teach the course content. Additionally, the students will be held accountable for making a conscientious effort to show up and participate in class and to learn the material.

The students must have a readiness to learn, or the entire process is null and void. The students must develop better study habits and a greater desire to learn. This desire should be developed over time, with the help of parents and teachers.

A strong proponent of making America’s schools the finest in the world was former President Bill Clinton. On March 16, 1998, President Clinton assembled a group of leaders from government, business, and education to discuss how to improve the

United States' educational system. Education World (1998), an educational web site, provides details outlining President Clinton's speech at this meeting:

In our balanced budget I proposed a comprehensive strategy to help make our schools the best in the world--to have high national standards of academic achievement . . . working to hire more well-prepared and nationally certified teachers, modernizing our schools for the 21st century, supporting more charter schools, encouraging public choice, ending social promotion, demanding greater accountability from students and teachers, principals and parents.

President Clinton's proposals set the stage and planted the seed that has grown into the goals and standards movement of today's educational system.

Vocational education courses take their direction from the academic education courses (math, science, and language arts) in testing and measuring learner outcomes and instructional results. Vocational education end-of-course tests should also (a) be reliable and valid, (b) have a clear purpose, (c) be aligned directly to state content standards, (d) be useful for school improvement, and (e) be operationally feasible.

Test scores are used to evaluate student mastery of vocational competencies and to show gains in student achievement. Well-designed testing programs within accountability systems enable educators to provide continuing evidence and proof to the public that students are learning more and that schools are improving.

The remainder of this chapter consists of a Statement of the Problem, Statement of the Purpose, Definition of Terms, Research Questions, Rationale, Assumptions, Delimitations, and Limitations.

Statement of the Problem

A system-wide end-of-course test for Automated Accounting/ Spreadsheets in Knox County, Tennessee, does not exist.

Statement of the Purpose

The purpose of this study was to document the development of a system-wide end-of-course test for the Automated Accounting/Spreadsheets course in Knox County, Tennessee, congruent with state and national standards.

Definition of Terms

The following terms were necessary in researching appropriate sources for end-of-course testing:

Automated Accounting Course – a course in which students will apply generally accepted accounting principles, procedures and techniques to a computerized accounting environment (<http://www.k-12.state.tn.us/pdf/veautoacct.pdf>, 2000).

Competency – the quality of being adequately or well qualified physically and intellectually

(WordNet, 1997, <http://www.dictionary.com/cgi-bin/dict.pl?term=competency>).

End-of-course tests – a 90-minute, paper-and-pencil assessment of performance objectives, written for all secondary courses at all ability levels (Knox County Schools, 2001).

Spreadsheet Applications Course – involves the use of electronic worksheets to perform business calculations (<http://www.k-12.state.tn.us/pdf/vespreadsheet.pdf>, 2000).

Research Questions

This study answers the following questions:

1. **Why require system-wide end-of-course testing** in the Automated Accounting/Spreadsheets course?
2. **What are the federal, state, and local (a) guidelines, (b) procedures, and (c) timelines** for developing end-of-course testing?
3. **What Tennessee standards and competencies are addressed** in the teaching of the Automated Accounting/Spreadsheets course?
4. **What generic procedures are followed** for competency test development or construction?
5. **Who are the local school system teacher practitioners responsible** for serving as subject matter experts for competency test development for the Knox County Automated Accounting/Spreadsheets course?

Rationale for the Study

A complete semester of a course concludes with the following four letters: EOCT. These letters refer to end-of-course tests, which numerous secondary students are required to complete in order to fulfill the requirements of their high school courses of study. The Education Accountability Act, as stated on The School District of Pickens County, South Carolina, web site (2001, September 25), end-of-course tests, which guide students' curriculum and evaluate their abilities to satisfy the course standards, should be given to all students seeking a high school diploma.

Kurt F. Geisinger (1992) of Fordham University at the Second National Research Symposium on Limited English Proficient Student Issues stated:

From an [*sic*] historical perspective, the widespread use of such [competency] examinations and assessments probably grew out of the “back to basics” movement which emerged in response to charges that many of the graduates of our educational system lacked the fundamental academic skills of reading, writing, and mathematics necessary to succeed in adult life, to hold useful and meaningful jobs, and to serve as responsible citizens. From the more limited psychometric or educational testing perspective, such tests probably developed out of the “criterion-referenced testing” movement which occurred in the period from approximately the mid-1960s through the early 1980s. The purpose of such tests was to integrate educational tests more meaningfully into the instructional process by reflecting exactly what knowledge, skills, and other educational behaviors students “mastered” and on which they therefore needed no further instruction.

End-of-course test results can aid teachers in directing how they undertake teaching knowledge and skills that might not otherwise have been accomplished academically. Group end-of-course test score results should indicate whether students are not mastering the content of a particular area within the course. These test results should notify the teacher that some changes are needed in the curriculum design or instructional methods. Quality tests that are valid and reliable provide the incentive for successful and effective teaching and inspired learning.

The end-of-course test results not only furnish documentation of learner progress and mastery of subject matter content, but also aid teachers in knowing how to improve continually the quality of instruction embodied within a course. This knowledge allows

teachers to regulate their instructional strategies so that learner differences can be accommodated. Students gain valuable feedback about their progression towards developing the useful and important know-how and skills that has been defined by academic professionals and the public.

The Educator's Guide to the Wisconsin High School Graduation Test (HSGT) published by the Wisconsin Department of Public Instruction states:

[A] benefit of these tests is large-scale comparability. If large numbers of students take the same examination . . . policymakers, parents, teachers, and the general public can compare test performance from year to year and among schools, districts, and regions of the state. . . . Test results would identify both students' and school systems' levels of competencies. Additionally, test results should indicate areas of success and pinpoint units requiring improvement.

On October 29, 1998, the Tennessee State Board of Education, in compliance with TCA 49-1-608 and TCA 49-6-6001 (a) (1) and based upon the High School Testing Advisory Committee's recommendation, delegated 10 high school courses to develop and adopt end-of-course tests. The Tennessee Department of Education web site (n.d.) explains the High School End-of-Course Tests Policy:

The Board stipulated that beginning with students entering the 9th grade in 2001-2002, students must successfully pass examinations in three subjects: Algebra I, Biology I, and English II. These examinations later became known as gateway examinations. The other seven areas to be tested are Math Foundations, Geometry, Algebra II, Physical Science, Chemistry, English I, and U.S. History.

The Tennessee Department of Education's web site concerning High School End-of-Course Tests Policy further states, "the proposed assessment program is consistent with legislative intent . . . [and] it also fulfills the commitment of the Governor [of Tennessee] to a 'diploma that means something'." The assessment plan is uniform with the emphasis of the High School Policy developed by the Tennessee State Board of Education, which is a guarantee that the students achieve high standards by reforming the system on a school-wide basis.

According to the Tennessee Department of Education's web site (n.d.) related to High School End-of-Course Test Policy, specifically focusing on end-of-course grade use, the policy stated that on September 20, 2001, the Tennessee State Board of Education endorsed the following guidelines for admission of the test scores in the student's grade:

Results of individual student performance from all administered end-of-course tests including the three gateway examinations shall be provided to the individual teacher in a timely fashion to facilitate the inclusion of these results as a part of the student's grade in that subject. This result shall count not less than fifteen percent (15%) of the student's grade in the semester in which the test was administered.

Other items that were endorsed for admission into the end-of-course test policy were the following: "No Senior exemptions from EOC; the exams should assess as many indicators as possible without exceeding 90 minutes; fifty percent [50%] of test items must be of high order level from Bloom's Taxonomy (synthesis/evaluation)" (Knox County Schools, 2001).

According to the High School End-of-Course Tests Policy for the State of Tennessee, detailed on the Tennessee Department of Education web site (n.d.), specifically related to High School End-of-Course Tests Policy, the purposes and the rationale for implementing end-of-course testing include the following:

1. Improvement of student learning in core content areas.
2. Preparation for further learning.
3. Improve student performance and preparation for standardized tests.
4. School and program improvement.
5. Accountability is increased.

In September, 1999, the timeline and initiative objectives were developed for 15 vocational courses in Knox County, Tennessee to utilize in the construction of end-of-course tests. The Automated Accounting/Spreadsheets course was identified for end-of-course test development, which was the focus of this study. The vocational test policy was targeted to be a reflective image of the guidelines developed for the original 10 academic courses.

The Automated Accounting/Spreadsheets End-of-Course Development Team was established for the Knox County, Tennessee School System in 1999. This development team was made up of 10 teachers who teach in this subject area. By November 2001, these educators had begun the process of developing a test bank of questions for the Automated Accounting/Spreadsheets end-of-course test. The test consisted of both factual and conceptual questions and was constructed to relate directly to the competencies diagrammed and laid out by the Tennessee State Department of Education. The next step was to continue the process of creating a valid and reliable system-wide

end-of-course test for Automated Accounting/Spreadsheets course given to the students in May of 2001.

Assumptions

The following assumptions were formulated in the present research of end-of-course test development for Automated Accounting/Spreadsheets course in Knox County, Tennessee:

- All members of the Automated Accounting/Spreadsheets development team had expertise in this subject area.
- All members of the Automated Accounting/Spreadsheets development team were knowledgeable of the Tennessee state competencies for this subject area.
- All members of the Automated Accounting/Spreadsheets development team were knowledgeable of the objectives and the timeline that was outlined by the Knox County, Tennessee school system.

Delimitations

The following delimitations were formulated for documentation of end-of-course test development for Automated Accounting/Spreadsheets in Knox County, Tennessee:

- This study originated when the end-of-course development team was one-third to completion of the system-wide end-of-course test for Automated Accounting/Spreadsheets.
- The scope of this study included documentation of the development processes for Knox County's Automated Accounting/Spreadsheets end-of-course test. Therefore, actual determination of test reliability and validity were not addressed.

Limitations

The following limitations were formulated in the present research of end-of-course test development for Automated Accounting/Spreadsheets in Knox County, Tennessee:

- This study was limited to documentation of end-of-course test development for Automated Accounting/Spreadsheets in Knox County, Tennessee.
- While the original intent was to document development of the Automated Accounting/Spreadsheets end-of-course test through its projected implementation in May 2002, the actual implementation date was postponed until December 2002. Postponement of initial test implementation/administration coincides with the projected return of Ms. Julia DeBord, who serves as Knox County's Business Education Supervisor. In March 2002, Ms. DeBord had to take emergency medical leave from her position with the Knox County School System. Consequently, determination of the test's validity and reliability will occur early fall 2002, which exceeds the targeted summer completion date of this research project.

CHAPTER II

Review of Literature

The following review of literature discusses prior research and writings concerning end-of-course testing for high school/secondary education and qualitative research methodology supportive of such test construction. This review contains six primary areas of the end-of-course test development process that is presented and discussed in this research. The six major areas included in this research are: (a) How competency/end-of-course testing is a national phenomenon; (b) A look at standards and testing accountability; (c) The process of developing a valid and reliable testing tool; (d) The construction of competency/end-of-course tests; (e) The Tennessee course standards for Automated Accounting and Spreadsheet Applications; (f) The Qualitative Research Methodology. Each section shows how the topic has contributed to the present research, and how the present research adds to the existing body of knowledge.

National Phenomenon

End-of-course testing is sweeping the nation and is projected to be a large part of futuristic education in the United States. Lynn Olson (2001) showed how the outreaching arms of end-of-course testing is stretching across America:

High school students in Maryland saw a new addition to their coursework this spring: state-mandated end-of-course exams. . . . Maryland is one of about a dozen states that either have or are preparing such curriculum-based exams as a way to strengthen the high school curriculum and ensure that all students have mastered a core body of knowledge and skills. . . . Encouraged by the SREB, the

states that have adopted end-of-course exams include many in the South: Georgia, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia. . . . Philadelphia, meanwhile, is one of the public school systems to implement districtwide end-of-course tests for high school students.

At last, America has a national education strategy in which valid and reliable competency/end-of-course testing will play a big role. The Thomas B. Fordham Foundation (n.d.) states, “Tests, directly linked to the standards, are critical. . . . To be effective, though, assessments must yield reliable information about student, teacher, and school performance vis-à-vis the academic standards.”

During their administrations, Presidents Ronald Reagan, George H. Bush, and Bill Clinton all strongly encouraged that education reform be a priority for America. The emerging view of American education stressed that U.S. citizens cannot continue to be complacent nation, and it is critical that the students and citizens be prepared for the 21st century. Robert B. Schwartz and Marian A. Robinson (2000) stated:

In releasing *A Nation at Risk* [in 1983], President Ronald Reagan asserted that the poor performance of the education system imperiled the nation’s economic security, but that this was the states’ problem to fix. The states accepted the challenge . . . an unprecedented flood of education initiatives emanated from virtually every statehouse in the nation.

Groundbreaking legislation, known as America 2000, was introduced during George H. Bush’s presidency. Although the legislation did not pass, America 2000 laid the foundation for educational anticipation and accountability. As stated in the *Education World* (1998) web site, “President Bill Clinton convened leaders from government,

business, education, and the scientific community to discuss how the nation should respond to recent findings from the Third International Math and Science Study (TIMSS) showing that U.S. 12th graders lagged below the international average in science and math.” Based upon the *Education World* (1998) web site, at this gathering of community leaders, President Clinton, during his speech, stated:

Earlier this month our country received a wake-up call. Our high school seniors ranked near the bottom in math and science achievement when compared with peers around the world, according to the TIMSS test results. This must be a call to action for all of us. That’s why I’ve asked some of America’s top educators, advocates, political and business leaders here today, to mobilize our schools to raise standards, demand accountability, and specifically, to strengthen math and science education and performance all across America.

According to Schwartz and Robinson (2000), President Clinton introduced legislation in 1994 that was known as *Goals 2000*. “The core of *Goals 2000* is Title III, through which states received funds to realign their systems, as they saw fit, to achieve the national goals.” After much debate, the *Goals 2000* legislation passed and was enacted in 1994.

The lessons of the last two decades, from President Ronald Reagan to the present, have shown America that a nationwide educational strategy must be directed by the individual states. From this educational strategy, the United States has seen the focus turn to standards, professional development for teachers, accountability, and assessment (primarily end-of-course testing).

Standards and Testing Accountability

Accountability is the state of being responsible or liable for one's area of circumstances. Accountability has been an educational issue for many years. According to Jacob G. Beard (1986, ¶ 2):

During the 1970s there was considerable criticism of the schools, and accusations of as a means of holding the schools accountable for graduation of literate students who would at least be able to perform the basic skills of reading, writing, and arithmetic. All students would be tested for minimum competencies and failures would be remedied before graduation. Students who were unable to remedy their weaknesses and pass the test before graduation would be given certificates other than high school diplomas.

As a nation 30+ years later, America's educational systems are still dealing with the same concerns and criticisms. The focus of today's educational standards-based accountability system is to confront these concerns and criticisms head on to improve the quality of education and teaching that will allow all students to succeed at a higher level.

The U.S. educational system has witnessed an absence of concise standards and genuine accountability for much too long. As a nation, fortunately the educational system is on the road to change. "Since 1988 the public and policymakers have continued to press to improve schools, 'do accountability right' and show results in student achievement" (SREB High Schools, 1998). The learning and accountability go "hand in hand" and have emerged as a critical part of America's educational future. The Southern Regional Education Board (SREB) determined:

Content and student achievement standards are the most important elements of a good system of school accountability. Content standards define what students should learn and student achievement standards define how well students should learn it. Accountability for student learning is impossible without a clear, focused “road map” of what and how well students are to learn from kindergarten through graduation

America’s public and its elected officials want to see a progression of school growth and learner accomplishment. “Developing appropriate content and student achievement standards are an important part of showing policymakers and the public a ‘return on their educational investment’” (SREB, 1998). State policymakers have not included teachers in the development process of the achievement standards, nor have they appraised the process of executing, quantifying, and attaching the standards to accountability. The SREB (1998) indicated:

Content and student achievement standards should be:

- developed with considerable input from a variety of sources,
- concise and understandable,
- rigorous and challenging,
- reasonable and attainable,
- focused and organized by grade level or course, and
- measurable whenever possible.

Properly constructed and arranged achievement standards will explain the outcomes that the United States thirst for in its educational system.

The performance of America's public schools is grounded on the outcomes of the state (end-of-course) testing programs. These testing programs have become a considerable, yet, a disputable piece that makes up the state accountability agendas. The policymakers that are responsible for developing these accountability programs are under public attack to see school improvement. "Public confidence in public education and future investments by policymakers rest largely on continuing evidence from schools that students are learning more and that schools are improving. Well-designed testing programs in accountability systems enable educators to provide that proof" (SREB, 1998).

The individual states must be accountable to provide the time, resources, and training that will allow for the proper execution of the testing programs. End-of-course tests that are properly tied to the state standards has the opportunity to fortify the public as advocates of what America is trying to accomplish with its educational system. "Assessments must be trustworthy" (SREB, 1998).

The SREB (1998) recommended that state assessments include the following factors:

- reliability and validity for accountability purposes,
- a clear purpose,
- direct alignment to content standards,
- usefulness for school improvement, and
- operational feasibility.

Teachers are responsible for meeting the course standards, and the end-of-course testing program is a measuring tool that shows the public if teachers are sufficiently

performing their duties as educators. If a student is not passing a class or does not achieve a passing grade on the end-of-course test, the teacher must be held accountable for not adequately relating the information to that particular student. The teacher may need to develop his or her teaching strategy in order to relate to each of the student's learning styles. Also, accountability must fall on the students. The students must have a readiness to learn and be willing to make a conscious effort to participate and learn the course material. Without the students being ready and willing to learn, the entire educational process is truly extinct.

Validity and Reliability

How does an educational system determine the quality of a test? Quality rests with a uniting of validity and reliability. The SREB (1998) supported that:

State tests should be reliable and valid for accountability purposes. A state testing system must incorporate the key technical considerations of reliability, validity, fairness and bias. Failure to adequately address these critical considerations weakens an accountability program that includes high-stakes and might face legal actions. As a director of a state testing program pointed out, 'If you deny something valuable to people that they expected, you're probably going to get a lawsuit.'

The SREB (1998) recommended that policymakers consider the following questions during the test development process:

What is the purpose of the test, and how will the results be used? . . . Is the test valid? Does it measure what it is supposed to measure? . . . Is the test reliable? Can the results be trusted? . . . Is the test fair?.

Based on Lexico, LLC (2001), validity is “the quality or state of being justified, defended, or supported.” Validity tells the schools and the public if the test scores are correct, legitimate, concise, and usable. “A variety of inferences may be made from test scores, and evidence should be collected to verify that the test scores can support the inferences made.” *The Educator’s Guide to the Wisconsin High School Graduation Test (HSGT)* (n.d.) provides a simple example to illustrate and emphasize the meaning of the previous statement:

For example, a valid 10th-grade science test makes it possible to draw conclusions about a student’s ability in 10th-grade science. If the test is genuinely valid, then students who score well actually possess the knowledge and skills being tested, and students who score poorly have not mastered the 10th-grade science content being measured.

A valid testing tool relies on the coverage of the course material that is being tested, the excellence of the test questions, and what conclusions can be derived from the test scores. Limited test coverage of the course material does not allow the educators to make any definitive determinations from the test scores. “If a 10th-grade science test is missing key content taught in 10th-grade, the conclusions based on the test scores must recognize this limitation” (*Educator’s Guide to the HSGT*, n.d.).

Reliability must also live within a testing tool. Reliability is “an attribute of any system that consistently produces the same results, preferably meeting or exceeding its specifications” (*The Free On-line Dictionary of Computing*, 2001). A testing tool that is reliable has uniformity, can be duplicated, and can stand the “yardstick” of time. *The Educator’s Guide to the Wisconsin HSGT* (n.d.) states:

Reliability is critical for scores near a cut point that separates two levels of results. For example, a cut score may separate “passing” scores from “failing” scores or separate an acceptable performance from an unacceptable level of performance on a test. To accurately classify test scores and minimize misclassification, tests must provide trustworthy and consistent measures. Making a test longer by including more test items is one way to increase the reliability of scores, because the additional test items provide students a greater opportunity to demonstrate their knowledge.

A plethora of steps may be taken in the development of a valid and reliable testing tool. These steps are detailed and comprehensive, and they will be discussed in more detail in the “Test Development” section of this paper. “This [test construction] process includes considerable input from diverse professionals at every stage, and is essential in the development of accurate and highly-valued exams” (*Educator’s Guide to the Wisconsin HSGT*, n.d.).

Competency/End-of-Course Test Development

Test development is not a simple or quick process. The construction of a valid and reliable end-of-course testing tool requires numerous steps. The steps are amplified and exhaustive because of the importance of the final testing tool that is being produced. The Donath Group (n.d.), a highly trained team of test development experts suggested:

A test can be considered a systematic process of interviewing examinees to determine specific skills and competencies. Unlike a free-form interview, a test does this in a uniform format that is fair, efficient, and cost-effective. A test

should be a representative sample of behavior from a well-defined domain of content.

The beginning step in the test development process is to ascertain the latitude and extent of the skills that the test will gauge. Test development should “paint a portrait” of the course objectives and should come to a decision about the content that a student is expected to know at the end of the course.

After determining the range of a test, the next step is to choose the general composition of the testing tool that will properly measure the learner’s knowledge. As educators, test development normally consists of objective or essay test; these also can be combined to make an effective testing tool. The objective test can be made up of true-false, multiple choice, short answer, or matching test questions. An educator’s teaching style and philosophy, along with the type of course, will be strong factors in the determination of the most befitting test format. For instance, an objective test would be more appropriate for a course that has stressed facts and skills for student memorization. If you want to know a student’s ability to analyze, synthesize, or evaluate the course’s content, the more appropriate tool would be an essay test.

After choosing the composition for the test questions, the construction process should “devise [the] test and item specifications that provide the guidelines for writing test items and creating test forms” (*Educator’s Guide to the HSGT*, n.d.). For example, what percent of the test will be factual questions and what percent will be conceptual questions? Also, are the test forms computer generated? What font will be used? What is the spacing? Will the type be upper or lower case letters? How will the test be aligned or outlined? These questions are all important to the test development process. According to

a teaching assistant's handbook from the University of Georgia, as stated on the Test Development web site (n.d.):

The next step is to write the test items and arrange them in the order you want the items included in the test. If you use discussion or essay questions, the task of test development generally takes less time; but be sure to allow sufficient time to grade the papers. Conversely, objective tests require much more time and skill to prepare but are much easier to grade. Once the test is designed, it should be carefully reviewed to see if it is valid, meaningful, and reasonable in length and difficulty. A trivial test can be dispiriting to a conscientious student, and a test that is too difficult or too long for the allotted time can be very discouraging for the entire class.

After the test has been designed, the *Educator's Guide to the Wisconsin High School Graduation Test* recommends some additional steps that are of the utmost importance in the construction of a test that is precise and rated highly. These additional steps are as follows:

- Conduct pilot sessions to determine whether students understand the test questions, whether the directions and questions are clear, and whether the item formats and individual items elicit the expected responses.
- Conduct a field test with student groups that are similar to those student groups for whom the test is designed.
- Statistically analyze the results of the field test to determine the level of difficulty for each item, whether items discriminate clearly between students

who have the knowledge and skills being tested and those who do not, and whether items favor one group of students over another group.

- Conduct reliability and validity studies of the test.
- Develop directions for administration of the field test and interpretation of the test scores (*Educator's Guide to the HSGT*, n.d.).

The Knox County (Tennessee) School System, which is the focus area for this research, established a four-year timeline to follow as a guideline for developing and implementing its end-of-course tests. To provide a realistic test development process, the Knox County School System's timeline is as follows:

1999 timeline.

- May – September: Content areas write/edit performance objectives
- September: Consultant train supervisors and principals in writing test items

2000 timeline.

- July – August: Finalize performance objectives; distribute to all principals
- September: Test writing process begins at individual high schools
- September: Test writing training for principals and chair/key teachers

2001 timeline.

- May: Questions sent to research department/supervisors
- May: First EOC tests implemented at individual high schools

- July: Supervisor evaluation of first EOC tests
 - August: Revised EOC test format distributed to Principals/Teachers
 - August: Supervisors lead revision work
 - December: Second EOC tests given at individual schools
-

2002 timeline.

- January: Second EOC tests and test analyzations sent to research department
 - February: Supervisors/teachers start work on system-wide test format
 - May: First system-wide EOC test given
 - June: System-wide test analyzations sent to research department (Knox County Schools, 2001).
-

The test development process is a lengthy, yet, an important process. “Failure to go through this time-consuming, exhaustive process will threaten the validity of a test. As a result, the development of statewide, standardized tests may require additional years between their inception and implementation” (*Educator’s Guide to the HSGT*, n.d.).

Tennessee Standards

The focus of this study is the developmental process of an end-of-course test for the Automated Accounting/Spreadsheets course. The Knox County (Tennessee) School System has taken the Automated Accounting course and the Spreadsheets Applications course and combined them into one course of study. The only issue is that the Tennessee

Department of Education still has separate standards for each of the previously mentioned courses. So, the end-of-course test that was developed for the Automated Accounting/ Spreadsheets course was directly aligned to each individual set of state content standards. The purpose of this section is to list and describe the Tennessee state standards for both the Automated Accounting course and the Spreadsheet Applications course. The Automated Accounting course has seven primary standards and the Spreadsheet Applications course has six primary standards. Each course's set of primary standards is broken down into sub-standards.

The Automated Accounting course description that has been constructed by the Tennessee Department of Education is as follows:

Automated Accounting is a course in which students will apply generally accepted accounting principles, procedures and techniques to a computerized accounting environment. Students will enter realistic accounting transactions for a variety of business applications and generate financial statements, spreadsheets and other management information reports

(<http://www.k-12.state.tn.us/pdf/veautoacct.pdf>, 2000).

The seven standards created by the Tennessee Department of Education for the Automated Accounting course are as follows:

Standard: 1.0

The student will learn to operate integrated accounting software and set up a computerized accounting system.

Sub-standard(s):

1.1 Manipulate the menu bar and toolbar items to perform general operating procedures.

1.2 Create a customized computer accounting system and enter system setup data.

Standard: 2.0

The student will use computerized accounting software to complete the accounting cycle for a service business.

Sub-standard(s):

2.1 Perform file maintenance activities.

2.2 Perform general journal activities.

2.3 Perform end-of-period activities.

Standard: 3.0

The student will use computerized accounting software to complete the accounting cycle for a merchandising business.

Sub-standard(s):

3.1 Journalize transactions for a merchandising business organized as a partnership.

3.2 Maintain merchandise inventory records.

3.3 Prepare end-of-fiscal period reports.

Standard: 4.0

The student will apply generally accepted accounting procedures to maintain computerized records for plant assets.

Sub-standard(s):

- 4.1 Maintain plant asset data.
- 4.2 Display plant asset reports.
- 4.3 Generate and post depreciation adjusting entries.

Standard: 5.0

The student will use computerized accounting software to complete the accounting cycle for a corporation.

Sub-standard(s):

- 5.1 Journalize transactions for a business organized as a corporation.
- 5.2 Prepare end-of-fiscal period reports.

Standard: 6.0

The student will apply generally accepted accounting procedures to maintain computerized records for payroll.

Sub-standard(s):

- 6.1 Perform employee maintenance activities.
- 6.2 Complete payroll records.

Standard: 7.0

The student will demonstrate organizational and professional leadership skills.

Sub-standard(s):

- 7.1 Demonstrate self-initiative through group projects.
- 7.2 Examine the value of leadership skills.
- 7.3 Illustrate image building and public relations techniques.
- 7.4 Assess decision-making skills.

7.5 Demonstrate effective teamwork and group thinking applying conflict resolution techniques.

7.6 Demonstrate parliamentary procedure skills through group activities.

7.7 Analyze the goals and apply the principles of Business Professionals of America and/or Future Business Leaders of America

(<http://www.k-12.state.tn.us/pdf/veautoacct.pdf>, 2000).

“Spreadsheet Applications involves the use of electronic worksheets to perform business calculations. This course will develop skills in designing worksheets, writing formulas, analyzing data, charting data and managing data. Student Proficiency may lead to software certification” (<http://www.k-12.state.tn.us/pdf/vespreadsheet.pdf>, 2000).

The six primary standards developed by the Tennessee Department of Education for the Spreadsheet Applications course are as follows:

Standard: 1.0

The student will operate the electronic spreadsheet software and create and manipulate a basic worksheet.

Sub-standard(s):

1.1 Relate vocabulary terms specific to spreadsheet applications.

1.2 Utilize different types of cell entries and editing features.

1.3 Format cells, rows and columns.

1.4 Perform document maintenance functions.

1.5 Plan and create a customized worksheet.

Standard: 2.0

The student will create and enter formulas and format a spreadsheet.

Sub-standard(s):

- 2.1 Create formulas to perform spreadsheet calculations.
- 2.2 Apply font attribute changes to text and values in a spreadsheet.
- 2.3 Use the fill alignment function.
- 2.4 Add a group of values in a range.
- 2.5 Revise values formats in cells.

Standard: 3.0

The student will apply spreadsheet enhancement skills.

Sub-standard(s):

- 3.1 Design and create spreadsheets using special functions to enhance the worksheet.

Standard: 4.0

The student will use special functions to perform special calculations.

Sub-standard(s):

- 4.1 Use special calculation functions to generate an electronic worksheet.

Standard: 5.0

The student will produce spreadsheets while using print options for diverse output results.

Sub-standard(s):

- 5.1 Preview, proofread and edit the spreadsheet before printing.
- 5.2 Print spreadsheets using various page setups.
- 5.3 Develop spreadsheets while using graphs.

Standard: 6.0

The student will demonstrate organizational and professional leadership skills.

Sub-standard(s):

6.1 Demonstrate self-initiative through group projects.

6.2 Examine the value of leadership skills.

6.3 Illustrate image building and public relations techniques.

6.4 Assess decision-making skills.

6.5 Demonstrate effective teamwork and group thinking applying conflict resolution techniques.

6.6 Demonstrate parliamentary procedure skills through group activities.

6.7 Analyze the goals and apply the principles of Business Professionals of America and/or Future Business Leaders of America

(<http://www.k-12.state.tn.us/pdf/vespreadsheet.pdf>, 2000).

Qualitative Research Methodology

The qualitative research method utilizes in-depth examination and investigation of the subjects being studied. Qualitative research is “based on the collection and analysis of nonnumerical data such as observations, interviews, and other more discursive sources of information” (Gay & Airasian, 2000, p. 9). “The central focus of qualitative research studies is to provide understanding of a social setting or activity from the perspective of the research participants” (Gay & Airasian, 2000, p. 204).

There are five characteristics that relate to the majority of qualitative research studies. These five characteristics are as follows:

- First, the *sources of data for qualitative research are real-world situations*, the study of natural, nonmanipulated settings.
- Second, *qualitative research data are descriptive*.
- Third, *qualitative research emphasizes a holistic approach*, focusing on processes as well as final outcomes.
- Fourth, *qualitative data are analyzed inductively*; that is, a generalization is reached from collecting or observing multiple specific instances.
- Fifth, the researcher often seeks to *describe the meaning of the finding from the perspective of the research participants*, not the researcher him or herself (Gay & Airasian, 2000, p. 204).

Qualitative studies are not just reports. The qualitative study is the process of telling a story from the beginning to the end.

Summary

The use of end-of-course testing permeates the nation and is intended to be a substantial factor in the growth and future of America's educational system. The emerging view of American education stressed that the citizens cannot continue to be a complacent nation, and the preparation of students for the 21st century is critical. America has finally developed a national education strategy, and valid and reliable end-of-course testing will play a major role if a standards-based reform scheme has the opportunity to succeed. Test development must be tied directly to the state educational standards.

Accountability has been an educational issue for many years. During the last 30+ years, the U.S. educational system has faced enormous criticism because of the perceived poor performance of its students and schools. The focus of today's educational

accountability system is to confront these criticisms head on to improve the quality of education and teaching that will allow all students to succeed at a higher level. America's public and its elected officials want to see a progression of school growth and learner accomplishment. Concise standards and genuine accountability in the United States' educational system have eluded educators and their students. As a nation, the United States is very fortunate that its educational system is on the road to change.

The quality of a test relies on the uniting of validity and reliability. Validity tells the schools and the public if the test scores are correct, legitimate, concise, and usable. A valid testing tool depends on the coverage of the course material that is being tested, the excellence of the test questions, and what conclusions can be derived from the test scores. Reliability must also exist within a testing tool. A testing tool that is reliable has uniformity, can be duplicated, and can stand the measurement of time.

Test development is not a simple or accelerated process. Numerous steps must be taken in the development of a valid and reliable end-of-course testing tool. The steps are amplified and exhaustive because of the importance of the final testing tool that is being produced. "Failure to go through this time-consuming, exhaustive process will threaten the validity of a test. As a result, the development of statewide, standardized tests may require additional years between their inception and implementation" (*Educator's Guide to the HSGT*, n.d.).

CHAPTER III

Methodology

The process and responsibility of developing a system-wide end-of-course test for Automated Accounting/Spreadsheets in Knox County, Tennessee “fell on the shoulders” of a local team of business education teachers who had the responsibility of teaching this course within their respective high schools. The sections in the Methodology are made up of Design, Subjects, Instrumentation/Data Collection, and Data Analysis. Figure 1 presents the Methodology Conceptual Framework that was the basis for this research study.

Design

The qualitative research method was selected for this study to document the development of a system-wide end-of-course test for Automated Accounting/Spreadsheets in Knox County, Tennessee. This approach was chosen because it “seeks to probe deeply into the research setting in order to obtain understandings about the way things are, why they are that way, and how the participants in the context perceive them” (Gay & Airasian, 2000, p. 16). The qualitative method allowed the researcher to “carry out in-depth examinations of a topic or problem over a sustained period of time” (Gay & Airasian, 2000, p. 19). Consistent with qualitative research design inclusion of sources of data from real-world situations, the present study represents investigation of end-of-course development in an actual school system.

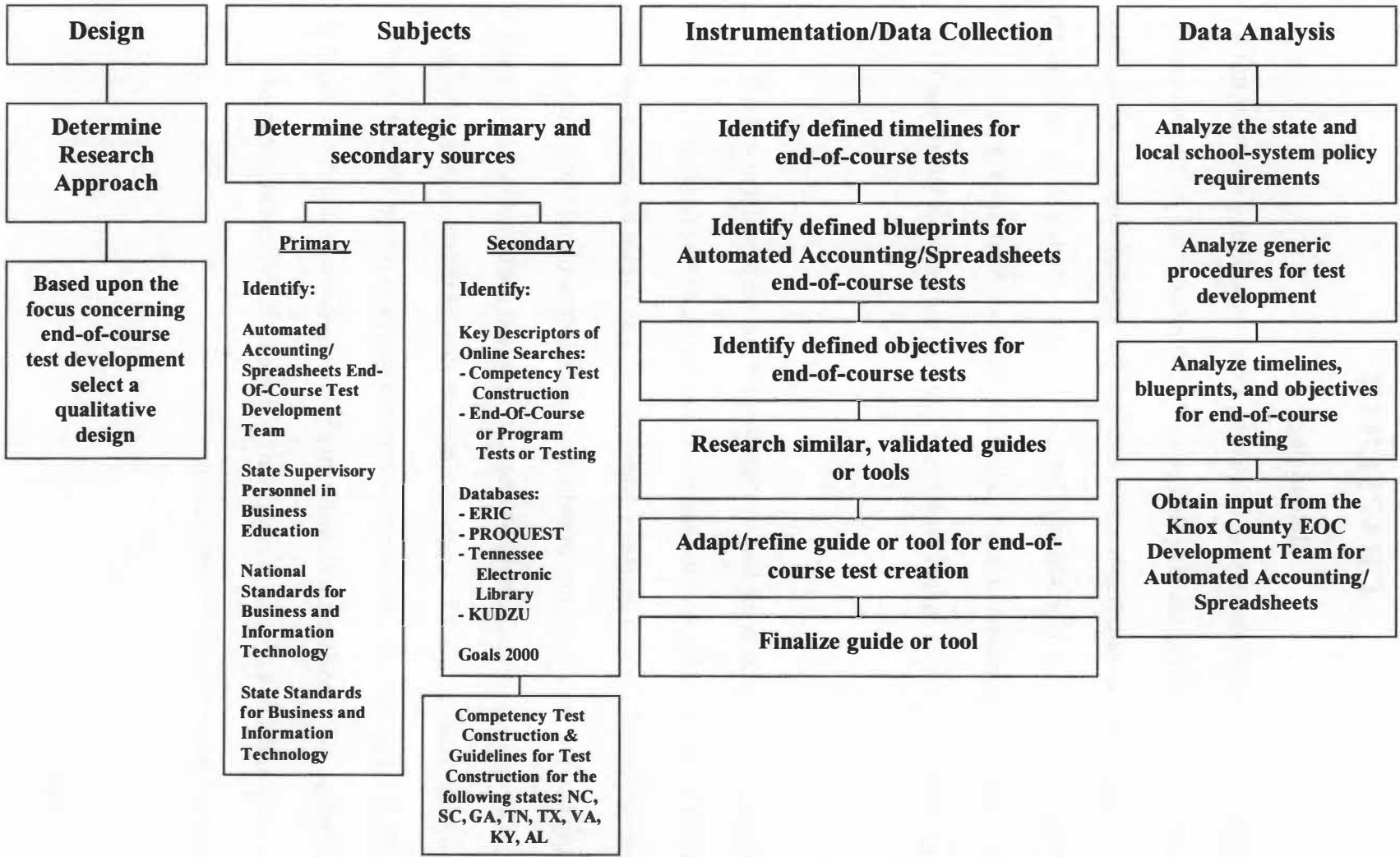


Figure 1. Methodology Conceptual Framework

Subjects

The subjects for this study came from both primary and secondary sources.

According to Gay and Airasian, primary and secondary sources are explained as follows:

Primary sources include first-hand information, such as eyewitness reports and original documents. Secondary sources include second-hand information, such as a description of an event by someone other than an eyewitness, or a textbook author's explanation of a researcher's theory (Gay & Airasian, 2000, p. 17).

The primary subjects for this research study were identified and derived from four sources. The first identified primary source was the Knox County (Tennessee) Automated Accounting/Spreadsheets End-of-Course Test Development Team. The responsibility for developing the Knox County end-of-course test for the Automated Accounting/Spreadsheets course fell upon a 10-member team of business education teachers who taught this course within their respective high schools. Those teachers included: Lisa Woods (Team Leader), Laura McCall, Bill Grandstaff, Gina Ellis, Dowell Bales, Ginger Hynds, Cheri Duncan, Skip McMillan, Geff Davis, and Shannon Hammontree. These teachers were identified because of their knowledge and experience in teaching the Automated Accounting/Spreadsheets course. Appendix A contains a listing of participating teacher signatures denoting their granting permission to have their identities shared in this research. Congruent with qualitative research design, this study focused upon the recommendations of the 10-member, end-of-course test development team.

Another primary source that was identified is the state department supervisors for Business Education in different areas of the United States. The purpose for utilizing the experience of the supervisors was to determine the status of their end-of-course testing

programs within their respective states. For the purposes of this study, the principle focus was upon the state department supervisor for Tennessee, Kara Burkett.

The next two identified sources were the National and State (Tennessee) Standards for Business and Information Technology. These standards had to be used by the test development team as guidelines for constructing the Automated Accounting/Spreadsheets end-of-course test. The course standards explained what the students should learn. In order to be effective, the end-of-course testing program had to be directly tied to both the National and State Standards.

Essential secondary sources utilized by the researcher during this study were key descriptors of online Internet searches, databases, and educational reform legislation, which was introduced by President Bill Clinton's administration, called *Goals 2000*. The main online key descriptors that were used included: "Competency Test Construction" and "End-of-Course/Program Tests/Testing." The reason the researcher made use of these key descriptors was to focus on successful testing programs that have been developed or were in the construction stage in various school systems around the country. The researcher focused on competency test construction and guidelines for test construction from states such as North Carolina, South Carolina, Georgia, Tennessee, Texas, Virginia, Kentucky, and Alabama.

Databases were utilized as a secondary source to gather related information for this study. Databases allowed the researcher to explore and analyze large collections of information organized for rapid search and retrieval. For the purposes of this study, the researcher utilized the ERIC, PROQUEST, Tennessee Electronic Library, and KUDZU

databases. These four databases helped with the location of articles and information that dealt with end-of-course/competency test construction.

As a secondary source, the researcher focused on publications dealing with important education reform legislation called *Goals 2000*. *Goals 2000* was the central focus of the Clinton administration's education reform agenda passed and enacted in 1994. The researcher concentrated on the *Goals 2000* legislation to show the beginning of America's national education standards-based strategy.

Instrumentation/Data Collection

Pursuant to the qualitative research design, the research data utilized in this study were descriptive. "A descriptive study determines and describes the way things are" (Gay & Airasian, 2000, p. 275). The researcher identified the previously defined Knox County School System timelines for the end-of-course test development process. The timelines that were established by the Knox County Board of Education covered a time span of four years that started in May of 1999 and ended in June of 2002. The timelines covered the process of choosing the test question format, creating guidelines for writing test items, writing the actual test questions, and the review and revision process of the testing format and the testing questions. The primary timeline participants were the high school principals and the teachers that were members of the respective end-of-course development teams.

Blueprints for the Automated Accounting/Spreadsheets end-of-course test were identified by the researcher. Utilizing the Tennessee State Standards for the Automated Accounting course and the Spreadsheets course, these blueprints were defined by the teachers on the end-of-course development team. These blueprints primarily showed the

student learning expectations for each course standard, the form of questions (factual or conceptual) related to each course standard, the number of days required to teach each of the concepts, and the total percentage of test questions constructed for each of the course standards.

The researcher identified the objectives for end-of-course testing defined by the Knox County Board of Education. The following test-development objectives were established: “[1] To unify instruction and assessment; [2] To increase student learning; [3] To improve quality of teaching so all students can succeed at a high level on EOC tests; [4] To provide additional data sources of student achievement” (Knox County Schools, July, 2001).

A search was conducted of validated end-of-course testing guides or tools that were established or constructed by other school systems around the country. Viewing other testing tools gave the researcher varied views of what to strive for as a final testing product. The researcher also gained a better understanding of: (a) testing formats that have worked and (b) the proper verbiage for writing test questions. After reviewing validated tools, the researcher was prepared to adapt and refine the select ideas and superior parts of those tools to aid in the development of an Automated Accounting/Spreadsheets end-of-course test.

After the end-of-course test was constructed in April 2002, Knox County Schools elected to postpone pilot testing and gauging test validity and reliability until the business education supervisor returned from a medical leave in August of 2002.

In conformity to qualitative research design, the present study emphasized a holistic approach, seeing the forest as well as the trees, which was applicable to both data collection and data analysis.

Data Analysis

A research study has to contain a depiction of the procedures used to dissect the data. Consistent with qualitative research design, the data for this study was analyzed inductively by gathering the required information, evaluating the possibilities, and suggesting an outcome. The data analysis for this study began by analyzing the state and local school-system policy requirements. According to the Tennessee Department of Education's web site (n.d.) specifically related to the High School End-of-Course Tests Policy:

On October 29, 1998, in compliance with TCA 49-1-608 and TCA 49-6-6001 (a) (1), the State Board of Education, accepted the recommendation of the High School Testing Advisory Committee. . . for the development of end-of-course examinations. . . .In the *High School End-of-Course Tests Policy*, the board stipulated that beginning with students entering the 9th grade in 2001-2002, students must successfully pass [the end-of-course] examinations. . . .The [local] program is consistent with the State Board of Education's *High School Policy*, which emphasizes school-wide reform to ensure that all students meet high standards.

The researcher analyzed generic procedures for end-of-course test development. The Knox County Board of Education established the following guidelines for end-of-course test writing:

General Guidelines

- Test must be typed or computer generated. Microsoft Word is preferable.
- Use 12 pt Times-New Roman font.
- Double space between test questions.
- Place graphics on the same page as test question.
- Type test in upper and lower case letters.

Stem Guidelines

- Use question or incomplete sentence format.
- Include as much of the item question as possible in the stem.
- Avoid using the negative format.
- Use Bold face type for the stem.

Distractor Guidelines

- Use capital letters followed by a period – A. B. C. D.
- Avoid using “none of the above.”
- Arrange response alternatives in alphabetical order or numerical order.
- Use four response alternatives.
- Use vertical alignment for responses.

Other Guidelines

- Code Performance Indicator information to the left of the test item.
- Construct 50% of all questions as higher order questions.
- Circle the test item number of higher order questions (Knox County Schools, July, 2001).

The researcher advanced by analyzing previously developed timelines, blueprints, and objectives for end-of-course test construction. The Knox County Board of Education timelines were used by the researcher as a “flow chart” to aid in the initial test construction through the review and revision process to adjust and enhance the final testing tool. The researcher utilized the blueprints that were established by the end-of-course development team as a pattern to ascertain the percentage of factual and conceptual questions to be constructed for each of the Automated Accounting and Spreadsheets course standards. Analyzing the end-of-course test objectives defined by the Knox County Board of Education allowed the researcher to focus on the goals of the local school system to make sure that each student meets higher educational standards through the end-of-course testing program.

After the data were analyzed, the researcher obtained input from the Knox County Automated Accounting/Spreadsheets End-of-Course Test Development Team. As experienced educators, the EOC development team was able to guide and direct the researcher to make any necessary changes that enriched the readability of the testing tool.

CHAPTER IV

Data Analysis and Findings

This chapter includes the data analysis and the findings for this qualitative research study. The chapter is based on the information that was gathered by the researcher in field observations conducted during this study. “Qualitative data analysis is basically a process of breaking down the data into smaller units, determining the import of these units, and putting the units together again in an interpreted form” (Gay & Airasian, 2000, p. 242).

To complete the aim of this qualitative study, data were analyzed and interpreted (a) to expose relevant curriculum demographics and (b) to respond to the five research questions. As shown by the Statement of the Problem, this study suggested that a system-wide end-of-course test for Automated Accounting/Spreadsheets in Knox County, Tennessee, does not exist. The purpose of this study was to document the development of a system-wide end-of-course test for the Automated Accounting/Spreadsheets course in Knox County, Tennessee, congruent with state and national standards.

The seven sections in this chapter are (a) Demographic Data Analysis, (b) System-wide End-of-Course Testing, (c) Federal, State, and Local Guidelines, Procedures, and Timelines, (d) Tennessee Standards and Competencies, (e) Generic Procedures, (f) Local School System Teacher Practitioners, and (g) Finalized Testing Tool.

Demographic Data Analysis

Consistent with qualitative research design inclusion of sources of data from real-world situations, the present study represents investigation of end-of-course development in an actual school system, and the research data utilized in this study were descriptive. According to the Tennessee Department of Education (n.d.), “The mission of the Business and Information Technology program is to provide instruction for and about business. . . . The Business and Information Technology standards will prepare students with relevant, flexible skills and a commitment to life-long learning.” In the Knox County, Tennessee, School System, the Business and Information Technology program consists of 22 courses. Table 1 shows the Business and Information Technology course offerings in this school system.

In the Knox County, Tennessee, School System, the total number of students that participated in the 22 Business and Information Technology (BIT) courses, during the 2001-2002 school year, equals 7,030. Of those 7,030 students, 132 students or 2% enrolled in the BIT course, Automated Accounting/Spreadsheets (J. Martin, personal communication, June 13, 2002). Figure 2 provides a graphic representation of the percent of BIT students that enrolled in the Automated Accounting/Spreadsheets (AA/SS) course, during the 2001-2002 Knox County, Tennessee, school year.

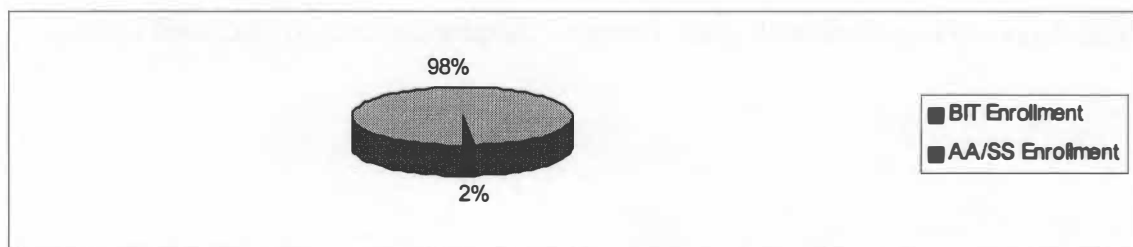


Figure 2. Automated Accounting/Spreadsheets Enrollment

Table 1. Business and Information Technology Course Offerings in Knox County Schools

Course	Grade(s)	Prerequisite(s)	Credit
Accounting I	10-12	None	1 unit
Accounting II	11-12	Accounting I	1 unit
American Business Legal Systems	12	None	½ unit
Automated Accounting/ Spreadsheets ^a	10-12	Accounting I and Keyboarding	1 unit
Business Communications	10-12	Document Creation Design	½ unit
Business Finance	11-12	None	½ unit
Business Management	11-12	None	½ unit
Business Principles	9-12	None	1 unit
Business Systems Tech I	11-12	Keyboarding	1 unit
Business Systems Tech II	11-12	Business Systems Tech I	1 unit
Computer Productivity Applications	10-12	Keyboarding	½ unit
Database Design	10-12	Keyboarding	½ unit
Desktop Publishing	10-12	Document Creation Design	½ unit
Document Creation Design	10-12	Keyboarding	½ unit
Information Management Systems I	12	Keyboarding and one other computer course	1 unit
Interactive Multimedia Design	10-12	None	1 unit
International Business	12	None	½ unit
Keyboarding	9-12	None	½ unit
Keyboarding Applications	9-12	Keyboarding	½ unit

**Table 1 (continued). Business and Information Technology Course Offerings in
Knox County Schools**

Course	Grade(s)	Prerequisite(s)	Credit
Personal Computing	9-12	None	½ unit
Programming Basic	10-12	Keyboarding and Algebra	1 unit
Programming C++	11-12	Keyboarding and Algebra	1 unit

Note. From “Section Two: Course Descriptions,” by Knox County Schools, January 17, 2000, *2000-2001*

Program of Studies, pp. 4 – 5.

^aAutomated Accounting/Spreadsheets can be divided into two courses, with ½ credit each.

The Automated Accounting/Spreadsheets course was offered in 50% (6 out of 12) of the schools in the Knox County, Tennessee, School System, during the 2001-2002 school year. The names of the Knox County Schools where the Automated Accounting/Spreadsheets course was offered, by semester, during the 2001-2002 school year, is depicted in Table 2 (J. Martin, personal communication, June 13, 2002).

System-wide End-of-Course Testing

The first segment of data analysis addresses findings associated with the researcher's pursuit of a response to **Research Question One:**

*** Why require system-wide end-of-course testing in the Automated Accounting/Spreadsheets course?**

Teachers testing students is by no means a new or unique process. Tests have been used by teachers to determine the learning progress of their students and unveil any obstacles that are prohibiting student achievement. The U.S. Department of Education (n.d.) states:

Testing has only recently emerged as an issue because taxpayers are asking more and tougher questions about the performance of their schools and students and seeking more and better information about school and student performance. The results of teacher-designed exams and a wide assortment of "off the shelf" tests are helpful, but they shed little light on school performance and academic program impact. A strong accountability system composed of annual testing keyed to rigorous academic standards and a challenging curriculum taught in the school provides the sort of information needed to determine what works, what

Table 2. High Schools that Offered the Automated Accounting/Spreadsheets Course, During the 2001-2002 School Year, by Semester

Knox County, Tennessee, School	Semester
Austin-East High School	Fall
Carter High School	Spring
Central High School	Spring
Gibbs High School	Fall
Powell High School	Spring
South Doyle High School	Spring

doesn't, how well students are achieving, and what to do to help those who need help.

The mission of today's educational community is to improve the potency and effectiveness of the school systems, the schools, and their curricular offerings. The dream of education is to ensure that "no child is left behind" by receiving an adequate education. "A teacher is effective when a student learns. It is impossible to determine teaching effectiveness without determining learning results. A teacher can present a great lesson, but if the students do not understand, then the lesson has no value" (U.S. Department of Education, n.d.). Testing at the end of a course is a strong indication of whether the students have learned the material.

The process of developing and administering the end-of-course tests has been mandated through the national, state, and local levels. The Tennessee State Board of Education (2001) stated:

The implementation of end-of-program assessments is consistent with high school reform initiatives, efforts to strengthen accountability, and legislation impacting education. . . . In writing the *Perkins Act of 1998*, Congress also placed emphasis on the need for measuring academic achievement and occupational attainment by requiring that states compile data on the success of students in vocational-technical education. While technically the Tennessee State Plan is in compliance with this legislation, by using competency profiles to measure occupational attainment, end-of-program tests would provide a much more objective method for doing so, thus strengthening Tennessee's measurement approach for this core indicator.

The Tennessee Department of Education web site (n.d.), specifically related to High School End-of-Course Tests Policy, states that the purposes and the rationale for implementing end-of-course testing include the following:

1. Improvement of student learning in core content areas. The tests will align with the curriculum standards and will include both content knowledge and critical thinking skills.
2. Preparation for further learning . . . in subjects taken later.
3. Improve student performance and preparation for standardized tests.
4. School and program improvement. The tests will provide data that can be used to improve the effectiveness of the instructional delivery system at the school and the school system.
5. Accountability is increased.

In response to **Research Question One**, the researcher determined that system-wide end-of-course testing in the Automated Accounting/Spreadsheets course targets providing teachers, students, and the public with timely, valid, and reliable information regarding student mastery of the curriculum.

Federal, State, and Local Guidelines, Procedures, and Timelines

The second segment of data analysis addresses findings associated with the researcher's pursuit of a response to **Research Question Two**:

*** What are the federal, state, and local (a) guidelines, (b) procedures, and (c) timelines for developing end-of-course testing?**

The federal government is the authorizing body or the "enactor" of the end-of-course testing program. Robert B. Schwartz and Marian A. Robinson (2000) stated:

In the Goals 2000 legislation put forth by the Clinton administration, the states were the locus [sic] of standards and assessment, with national standards serving only as exemplars to guide the development of state standards and benchmarks against which to judge them. In contrast to America 2000, national standards were to have no independent weight at the community level, for no national tests would be derived from them. In this spirit, the heart of Goals 2000 was its state grants program, designed to provide support both for such state-level activities as standards and assessments development and for district-level planning and implementation of standards-based reform.

The “enforcers” of the end-of-course testing program are the Department of Education for each state. In a *Washington Times* article, Vaishali Honawar (2002) reported:

Schools around the country, responding to the call for greater accountability, have implemented standardized testing programs over the past decade. And under President Bush’s No Child Left Behind Act, the stakes are higher than ever, with millions of dollars in federal funding tied to the tests.

In the U.S. educational system, the states have received the funds to restructure their educational systems, as they thought suitable, to fulfill the national objectives and standards. “In exchange for flexibility and minimal [federal] regulation, the states would be held accountable for improvements in student performance” (Schwartz & Robinson, 2000).

The Tennessee State Board of Education (2001) developed the following projected timeline for the end-of-course assessments:

- April 2001 First reading by the State Board of Education
- July 2001 Final reading by the State Board of Education
- Summer/Fall 2001 Professional Development Begins at Summer Conference and Continues Throughout Implementation

Test items developed for Round 1 (Agriculture, Health Science, **Information Technology**, Marketing, Technology Education)

- December 2001 Pilot tests for Round 1
- May 2002 Test given to Round 1

The local school systems are the “implementers” of the end-of-course testing program. The Knox County, Tennessee, School System established a four-year timeline to follow as a guideline for developing and implementing its end-of-course tests. To provide a realistic test development process, the Knox County School System’s timeline is as follows:

1999 timeline.

- May – September: Content areas write/edit performance objectives
- September: Consultant train supervisors and principals in writing test items

2000 timeline.

- July – August: Finalize performance objectives; distribute to all principals
- September: Test writing process begins at individual high schools
- September: Test writing training for principals and chair/key teachers

2001 timeline.

- May: Questions sent to research department/supervisors
- May: First EOC tests implemented at individual high schools
- July: Supervisor evaluation of first EOC tests
- August: Revised EOC test format distributed to Principals/Teachers
- August: Supervisors lead revision work
- December: Second EOC tests given at individual schools

2002 timeline.

- January: Second EOC tests and test analyzations sent to research department
- February: Supervisors/teachers start work on system-wide test format
- May: First system-wide EOC test given
- June: System-wide test analyzations sent to research department (Knox County Schools, 2001).

In response to **Research Question Two**, the researcher found that the federal, state, and local (a) guidelines, (b) procedures, and (c) timelines direct the collaborative efforts of the Test Development Team responsible for the design and creation of an evaluation tool congruent with national and state standards.

Tennessee Standards and Competencies

The third segment of data analysis addresses findings associated with the researcher's pursuit of a response to **Research Question Three**:

*** What Tennessee standards and competencies are addressed in the teaching of the Automated Accounting/Spreadsheets course?**

In most cases, the Knox County, Tennessee, School System has taken the Automated Accounting course and the Spreadsheet Applications course and combined them into one course of study. The only issue is that the Tennessee Department of Education still has separate standards for each of the previously mentioned courses. Since there are separate standards for each course, the end-of-course test that was developed for the Automated Accounting/Spreadsheets course was directly aligned to each individual set of state content standards. The Automated Accounting course has seven primary standards and the Spreadsheet Applications course has six primary standards. Each course's set of primary standards is broken down into sub-standards. Table 3 shows the standards for the Automated Accounting course and Table 4 shows the standards for the Spreadsheet Applications course.

In response to **Research Question Three**, the researcher found that the Tennessee standards and competencies addressed in the teaching of the Automated Accounting/Spreadsheets course included seven standards with a range of 2 to 7 sub-standards each for Automated Accounting and six standards with a range of 1 to 7 sub-standards each for Spreadsheet Applications. One standard appears redundantly in both the Automated Accounting and in the Spreadsheet Applications portions of the composite course;

Table 3. Automated Accounting Course Standards

Standards	Sub-standards
1.0: The student will learn to operate <u>integrated accounting software</u> and set up a <u>computerized accounting system</u> .	1.1: Manipulate the menu bar and toolbar items to perform general operating procedures.
2.0: The student will use <u>computerized accounting software</u> to complete the <u>accounting cycle for a service business</u> .	1.2: Create a customized computer accounting system and enter system setup data.
3.0: The student will use <u>computerized accounting software</u> to complete the <u>accounting cycle for a merchandising business</u> .	2.1: Perform file maintenance activities. 2.2: Perform general journal activities. 2.3: Perform end-of-period activities.
4.0: The student will apply <u>generally accepted accounting procedures</u> to maintain <u>computerized records for plant assets</u> .	3.1: Journalize transactions for a merchandising business organized as a partnership. 3.2: Maintain merchandise inventory records. 3.3: Prepare end-of-fiscal period reports.
	4.1: Maintain plant asset data. 4.2: Display plant asset reports. 4.3: Generate and post depreciation adjusting entries.

Table 3 (continued). Automated Accounting Course Standards

Standards	Sub-standards
5.0: The student will use <u>computerized accounting software to complete the accounting cycle for a corporation.</u>	5.1: Journalize transactions for a business organized as a corporation.
6.0: The student will apply <u>generally accepted accounting procedures to maintain computerized records for payroll.</u>	5.2: Prepare end-of-fiscal period reports.
7.0: The student will demonstrate <u>organizational and professional leadership skills.</u>	6.1: Perform employee maintenance activities.
	6.2: Complete payroll records.
	7.1: Demonstrate self-initiative through group projects.
	7.2: Examine the value of leadership skills.
	7.3: Illustrate image building and public relations techniques.
	7.4: Assess decision-making skills.
	7.5: Demonstrate effective teamwork and group thinking applying conflict resolution techniques.
	7.6: Demonstrate parliamentary procedure skills through group activities.

Table 3 (continued). Automated Accounting Course Standards

7.7: Analyze the goals and apply the principles of Business Professionals of America and/or Future Business Leaders of America.

Note. From “Automated Accounting,” by Tennessee Department of Education, August 31, 2000, *Business and Information Technology Standards*, pp. 3 – 10.

Table 4. Spreadsheet Applications Course Standards

Standards	Sub-standards
1.0: The student will operate the <u>electronic spreadsheet software</u> and create and manipulate a <u>basic worksheet</u> .	1.1: Relate vocabulary terms specific to spreadsheet applications. 1.2: Utilize different types of cell entries and editing features. 1.3: Format cells, rows and columns. 1.4: Perform document maintenance functions. 1.5: Plan and create a customized worksheet.
2.0: The student will create and enter <u>formulas</u> and format a <u>spreadsheet</u> .	2.1: Create formulas to perform spreadsheet calculations. 2.2: Apply font attribute changes to text and values in a spreadsheet. 2.3: Use the fill alignment function. 2.4: Add a group of values in a range. 2.5: Revise values formats in cells.
3.0: The student will apply <u>spreadsheet enhancement skills</u> .	3.1: Design and create spreadsheets using special functions to enhance the worksheet.

Table 4 (continued). Spreadsheet Applications Course Standards

Standards	Sub-standards
4.0: The student will use <u>special functions</u> to perform <u>special calculations</u> .	4.1: Use special calculation functions to generate an electronic worksheet.
5.0: The student will produce <u>spreadsheets</u> while using <u>print options for diverse output results</u> .	5.1: Preview, proofread and edit the spreadsheet before printing.
	5.2: Print spreadsheets using various page setups.
	5.3: Develop spreadsheets while using graphs.
6.0: The student will demonstrate <u>organizational and professional leadership skills</u> .	6.1: Demonstrate self-initiative through group projects.
	6.2: Examine the value of leadership skills.
	6.3: Illustrate image building and public relations techniques.
	6.4: Assess decision-making skills.
	6.5: Demonstrate effective teamwork and group thinking applying conflict resolution techniques.
	6.6: Demonstrate parliamentary procedure skills through group activities.

Table 4 (continued). Spreadsheet Applications Course Standards

Standards	Sub-standards
	6.7: Analyze the goals and apply the principles of Business Professionals of America and/or Future Business Leaders of America.

Note. From "Spreadsheet Applications," by Tennessee Department of Education, August 31, 2000,

Business and Information Technology Standards, pp. 3 – 9.

standard seven of Automated Accounting and standard six of Spreadsheet Applications pertains to student demonstration of organizational and professional leadership skills.

Generic Procedures

The fourth segment of data analysis addresses findings associated with the researcher's pursuit of a response to **Research Question Four**:

*** What generic procedures are followed for competency test development or construction?**

The development of a competency test is not an elementary or brief process. Development of a valid and reliable testing instrument requires a variety of steps. The steps are magnified and comprehensive because of the significance of the final testing instrument that is in the construction process. "A test can be considered a systematic process of interviewing examinees to determine specific skills and competencies" (The Donath Group, n.d.). Consistent with qualitative research design, the present study emphasized a holistic approach, shifting back and forth from the big picture to the specific parts, and the data was analyzed inductively by gathering the required information, evaluating the possibilities, and suggesting an outcome.

The researcher for this study identified six consistent, generic procedures that are followed for competency test development. The beginning step in the test development process is to ascertain the latitude and extent of the skills that the test will gauge. Test development should "paint a portrait" of the course objectives and should come to a decision about the content that a student is expected to know at the end of the course.

After determining the range of a test, the next step is to choose the general composition of the testing tool that will properly measure the learner's knowledge. As

educators, test development normally consists of objective or essay test; these also can be combined to make an effective testing tool. The objective test can be made up of true-false, multiple choice, short answer, or matching test questions. An educator's teaching style and philosophy, along with the type of course, will be strong factors in the determination of the most befitting test format. For instance, an objective test would be more appropriate for a course that has stressed facts and skills for student memorization. If you want to know a student's ability to analyze, synthesize, or evaluate the course's content, the more appropriate tool would be an essay test.

After choosing the composition for the test questions, the construction process should "devise [the] test and item specifications that provide the guidelines for writing test items and creating test forms" (*Educator's Guide to the HSGT*, n.d.). For example, what percent of the test will be factual questions and what percent will be conceptual questions? Also, are the test forms computer generated? What font will be used? What is the spacing? Will the type be upper or lower case letters? How will the test be aligned or outlined? These questions are all important to the test development process. According to a teaching assistant's handbook from the University of Georgia, as stated on the Test Development web site (n.d.):

The next step is to write the test items [or questions] and arrange them in the order you want the items included in the test. If you use discussion or essay questions, the task of test development generally takes less time; but be sure to allow sufficient time to grade the papers. Conversely, objective tests require much more time and skill to prepare but are much easier to grade. Once the test is designed, it should be carefully reviewed to see if it is valid, meaningful, and reasonable in

length and difficulty. A trivial test can be dispiriting to a conscientious student, and a test that is too difficult or too long for the allotted time can be very discouraging for the entire class.

The fifth step in the test development process is to review, evaluate, and amend the test questions by analyzing the questions for content, accuracy, and partiality. After the test has been designed, the *Educator's Guide to the Wisconsin High School Graduation Test* recommends an additional step that is of the utmost importance in the construction of an accurate and valuable test. The sixth step is to “conduct pilot sessions to determine whether students understand the test questions, whether the directions and questions are clear, and whether the item formats and individual items elicit the expected responses” (*Educator's Guide to the HSGT*, n.d.).

Although test development is not a simple or quick procedure, the aforementioned six-step process is conducive to replication. Figure 3 presents a flow chart that documents the competency test development process. Figure 4 shows a timeline graphic (Gantt Chart) representing time requirements and benchmarks for competency test preparation.

In response to **Research Question Four**, the researcher found that six major procedural steps comprise competency test development, namely, (Step 1) Determine Competency Test Objectives; (Step 2) Choose Format of the Test Questions; (Step 3) Devise Test and Item Specifications; (Step 4) Write the Test Questions; (Step 5) Review, Evaluate, and Amend the Test Questions; and (Step 6) Conduct Pilot Testing Sessions.

Local School System Teacher Practitioners

The fifth segment of data analysis addresses findings associated with the researcher's pursuit of a response to **Research Question Five**:

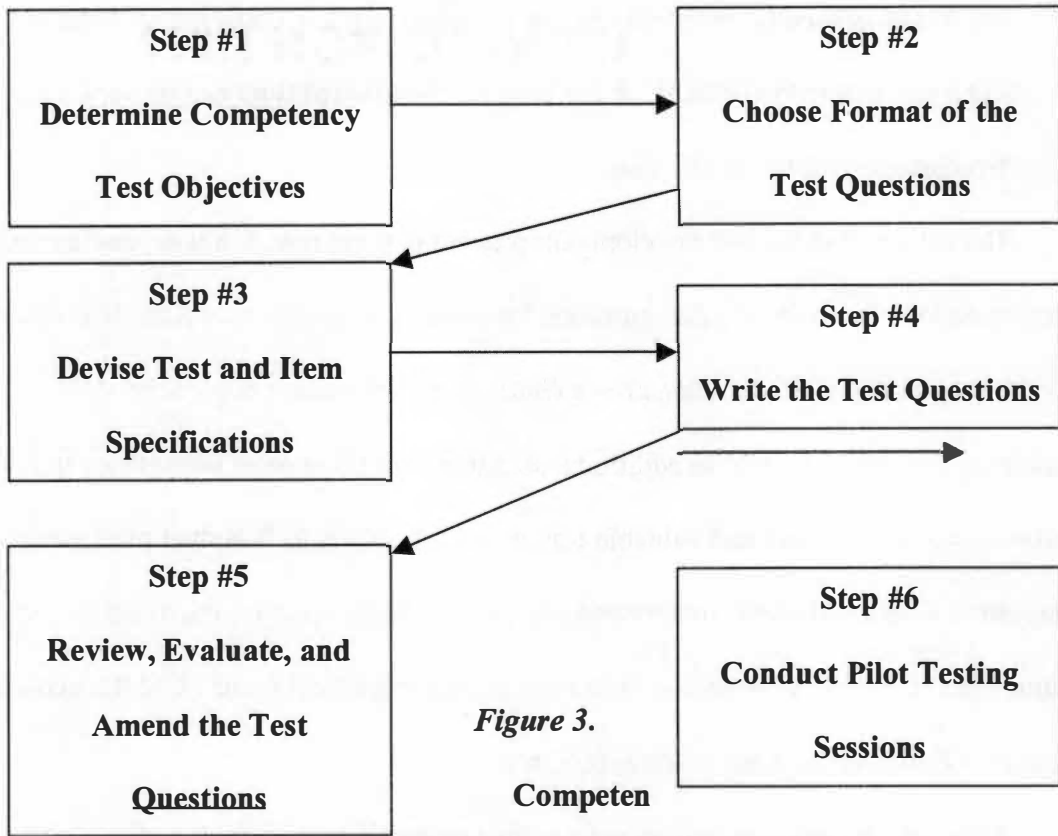


Figure 3.
Competen

cy Test Development Flow Process Chart

Years	1	2	3	4
Step #1: Test Objectives	■			
Step #2: Format Test Questions		■		
Step #3: Test Specifications		■		
Step #4: Write Test Questions		■		
Step #5: Review/Amend Questions				■
Step #6: Pilot Testing				■

Figure 4. Gantt Timeline Chart for Competency Test Development

*** Who are the local school system teacher practitioners responsible for serving as subject matter experts for competency test development for the Knox County Automated Accounting/Spreadsheets course?**

Each End-of-Course Test Development Team Member should have the following job skill set:

Qualifications.

- Is a certified Business Education Teacher.
- Is employed as a secondary teacher in the Knox County, Tennessee, School System
- Is a Subject Matter Expert who teaches the Automated Accounting/Spreadsheets course within their respective high schools.

Responsibilities and job duties.

- Reports (in most cases) to the Knox County Business Education Supervisor.
- Attends all of the test development in-service meetings.
- Is responsible for timely preparation and development of test questions.
- Collaboratively shares ideas with fellow Test Development Team Members.

Ten-member end-of-course development team.

Congruent with qualitative research design, this study focused upon the recommendations of the 10-member, end-of-course development team who taught this course within their respective high schools. These teachers were identified and chosen because of their knowledge and experience in teaching the Automated Accounting/

Spreadsheets course. The 10-member development team consisted of six female and four male teachers.

The development team was comprised of individuals with various degrees of teaching experience, which ranges from 2 to 25 years. Fifty percent of the teacher practitioners have seven or less years of teaching experience; 30% of the teachers have between 12 and 19 years of teaching experience; and 20% of the teachers have 25 years of teaching experience. The mean years of teaching experience among the 10-member development team was 12.2 years. Eighty percent of the 10-member team are tenured educators. The teachers on the 10-member development team represented 83% of the high schools in Knox County, Tennessee. Table 5 shows a profile of the educators, who teach the Automated Accounting/Spreadsheets course, in the Knox County, Tennessee, School System.

Development team contributions.

Each of the teachers played very important individual roles in the development of the Automated Accounting/Spreadsheets end-of-course test. Team members assumed the following roles: (a) leadership; (b) subject matter expert; (c) question development; (d) document preparation; (e) review and evaluation. Table 6 shows the teacher role contributions during the Automated Accounting/Spreadsheets test development process.

In response to **Research Question Five**, the researcher found that the 10 local school system teacher practitioners/subject matter experts responsible for Knox County's Automated Accounting/Spreadsheets course competency test development were chosen because of their knowledge in teaching this course within their respective high schools.

Table 5. Profile of the Automated Accounting/Spreadsheets End-of-Course Test Development Team

Teacher Name	Knox County, Tennessee, School	Tenured	Years of Teaching Experience
Lisa Woods, Team Leader	Powell High School	Yes	19 Years
Laura McCall	South Doyle High School	Yes	17 Years
Bill Grandstaff	Carter High School	Yes	25 Years
Gina Ellis	Austin-East High School	Yes	6 Years
Dowell Bales	Karns High School	Yes	25 Years
Ginger Hynds	Bearden High School	Yes	6 Years
Cheri Duncan	Halls High School	Yes	7 years
Skip McMillan	Central High School	No	3 Years
Geff Davis	Gibbs High School	Yes	12 Years
Shannon Hammontree	Farragut High School	No	2 Years

Table 6. Development Team Contributions to the Automated Accounting/ Spreadsheets End-of-Course Test in Knox County Schools

Teacher Name	Contributions to Test Development			
	Subject Matter Expert	Question Development	Document Preparation	Review and Evaluation
Lisa Woods ^a	X	X		X
Laura McCall	X	X		X
Bill Grandstaff	X	X		
Gina Ellis	X	X		X
Dowell Bales	X	X		
Ginger Hynds	X	X	X	X
Cheri Duncan	X	X	X	X
Skip McMillan	X	X		
Geff Davis	X	X		
Shannon Hammontree	X	X		X

^aEnd-of-Course Test Development Team Leader.

Finalized Testing Tool

The Automated Accounting/Spreadsheets end-of-course test has been successfully developed and will be administered to the students in December of 2002 (refer to Appendix B). The Test Development Team, with the approval of the Knox County School System, made the decision to develop two separate tests. A test was developed for both the Spreadsheet Applications and the Automated Accounting sections of the course and each test will be administered after the completion of the individual 45-day segments of a semester.

Factual and conceptual questions.

The tests consist of a mixture of standards-based factual and conceptual questions. Factual questions are based on the subject matter and course principles. Conceptual questions require higher-level thinking, the use of perceptual skills, and the application of the course principles. The Spreadsheet Applications test includes 31 factual questions and 25 conceptual questions, which makes up the overall total of 56 test questions. The Automated Accounting test has 50 test questions that are made up of 21 factual questions and 29 conceptual questions. Both of the tests utilized the multiple choice question format, with four possible answers (A., B., C., D.) to each question.

Validity and reliability.

A goal of the Test Development Team was to develop a test that was valid and reliable in measuring student performance and course effectiveness against the state (Tennessee) standards for the Automated Accounting and Spreadsheet Applications courses. Validity is “the quality or state of being justified, defended, or supported” (Lexico, LLC, 2001). Validity tells the schools and the public if the test scores are

correct, legitimate, concise, and usable. Reliability is “an attribute of any system that consistently produces the same results, preferably meeting or exceeding its specifications” (The Free On-line Dictionary of Computing, 2001). A testing tool that is reliable has uniformity, can be duplicated, and can stand the “yardstick” of time. The determination of the tests’ validity and reliability will not occur until the tests are implemented, during the fall semester of 2002, in the Knox County, Tennessee, School System.

Upon review of the total process for and resulting product of competency end-of-course test development, the researcher found that the Automated Accounting/Spreadsheets test represents a mixture of 52 factual and 54 conceptual standards-based multiple choice items.

CHAPTER V

Summary, Conclusions, Recommendations, and Implications

Consistent with qualitative research design inclusion of sources of data from real-world situations, the present study represents investigation of end-of-course development in an actual school system, and the research data utilized in this study were descriptive. After analyzing the data and inspecting the outcomes established in Chapter IV, a summary is given of the findings for this research study. The researcher arrived at a series of conclusions by utilizing the findings to promote additional debate. The grouping of the conclusions with the preceding critique of relevant literature allowed the development of pertinent recommendations. The summary, conclusions, and recommendations assisted the researcher in the building of implications for end-of-course test development for the Automated Accounting/Spreadsheets course.

This chapter is comprised of the Summary of Findings, Conclusions, Recommendations, and Implications.

Summary of Findings

System-wide end-of-course testing.

In response to **Research Question One,**

Why require system-wide end-of-course testing in the Automated Accounting/Spreadsheets course,

the researcher determined that system-wide end-of-course testing in the Automated Accounting/Spreadsheets course targets providing teachers, students, and the public with timely, valid, and reliable information regarding student mastery of the curriculum.

Federal, state, and local guidelines, procedures, and timelines.

In response to **Research Question Two,**

What are the federal, state, and local (a) guidelines, (b) procedures, and (c) timelines for developing end-of-course testing,

the researcher found that the federal, state, and local (a) guidelines, (b) procedures, and (c) timelines direct the collaborative efforts of the Test Development Team responsible for the design and creation of an evaluation tool congruent with national and state standards.

Tennessee standards and competencies.

In response to **Research Question Three,**

What Tennessee standards and competencies are addressed in the teaching of the Automated Accounting/Spreadsheets course,

the researcher found that the Tennessee standards and competencies addressed in the teaching of the Automated Accounting/Spreadsheets course included seven standards with a range of 2 to 7 sub-standards each for Automated Accounting and six standards with a range of 1 to 7 sub-standards each for Spreadsheet Applications. One standard appears redundantly in both the Automated Accounting and in the Spreadsheet Applications portions of the composite course; standard seven of Automated Accounting and standard six of Spreadsheet Applications pertains to student demonstration of organizational and professional leadership skills.

Generic procedures.

In response to **Research Question Four,**

What generic procedures are followed for competency test development or construction,

the researcher found that six major procedural steps comprise competency test development, namely, (Step 1) Determine Competency Test Objectives; (Step 2) Choose Format of the Test Questions; (Step 3) Devise Test and Item Specifications; (Step 4) Write the Test Questions; (Step 5) Review, Evaluate, and Amend the Test Questions; and (Step 6) Conduct Pilot Testing Sessions. Consistent with qualitative research design, the present study emphasized a holistic approach, shifting back and forth from the big picture to the specific parts, and the data was analyzed inductively by gathering the required information, evaluating the possibilities, and suggesting an outcome.

Local school system teacher practitioners.

In response to **Research Question Five,**

Who are the local school system teacher practitioners responsible for serving as subject matter experts for competency test development for the Knox County Automated Accounting/Spreadsheets course,

the researcher found that the 10 local school system teacher practitioners/subject matter experts responsible for Knox County's Automated Accounting/Spreadsheets course competency test development were chosen because of their knowledge in teaching this course within their respective high schools. Congruent with qualitative research design, this study focused upon the recommendations of the 10-member, end-of-course development team.

Conclusions

The researcher distilled five conclusions from the research findings. First, student mastery of curriculum, e.g. Automated Accounting/Spreadsheets, is the rationale for requiring end-of-course testing. Second, the overall or super process for local school system development of end-of-course testing mirrors and aligns with federal and state guidelines, procedures, and timelines. Third, *demonstration of organizational and professional leadership skills*, the one standard which appears redundantly in both the Automated Accounting and in the Spreadsheet Applications portions of the composite course, is youth organization focused rather than subject matter content focused. Fourth, the six major procedural steps that comprise competency test development represent a systems approach reflective of the input, process, output, feedback, and control processes. Fifth, teacher practitioners/subject matter experts qualify to develop end-of-course tests.

Recommendations

As result of completing this research project, the researcher makes the following recommendations:

1. The State of Tennessee Department of Education conduct a comprehensive research project to synthesize lessons learned by school systems that have engaged in end-of-course test development.
2. The State of Tennessee Department of Education use the researcher's generic model for end-of-course test development.
3. Additional research should be conducted pertaining to end-of-course test development.
4. The timeline for the test development process should be shortened to a more

reasonable and workable time frame.

5. End-of-course tests should be developed to accommodate a mixture of learning styles.

Implications

The principal implications of this study indicate how the research adds to the literature concerning end-of-course test development and how the results can be used by fellow researchers, by school administration, and by teachers. The research study adds to the literature for end-of-course test development by utilizing an abundance of the research from the past to formulate a needed directive for the future. The results of this research study can be used by educational professionals in three key areas: (a) basis for additional research, (b) guide for future test development, and (c) selection criteria for participants in the test development process.

The researcher learned a lot about end-of-course testing processes and products as a result of conducting this study. The paramount importance of open, honest, and frequent communication emerged as a given for educational professionals who engage in end-of-course test development.

With the advent of technology, communication tools such as e-mail listservs can provide timely and uniform information among test development team members. Use of e-mail listservs also provides team members with time and date stamped documentation of ongoing communication. Listserv use enables team members to have a running record of action item assignments and team member responsibilities.

Documentation of end-of-course test development related communication is of particular importance when the development process extends over a long period of time.

While Knox County Schools elected to engage in test development over a four-year time frame, the researcher believes that the very nature of technology-based business subject matter content continually changes and warrants rapid end-of-course test development.

Likewise, end-of-course test content should depict generic applications and processes rather than include software specific or dependent operations. Attention should also be given to end-of-course test inclusion of performance-based elements, particularly in the testing of student understanding, retention, and facility in using technology-based subject matter content. For example, an Automated Accounting/Spreadsheets test should contain an opportunity for students to demonstrate proficiency with the automated elements of the Automated Accounting/Spreadsheets course.

The researcher commends Knox County Schools for its involvement of lead subject matter experts in the development of an end-of-course test for the Automated Accounting/Spreadsheets course. Moreover, sustained administrative support for and student involvement in the end-of-course test development process are vital to the generation of quality end-of-course tests.

Use of the researcher's generic model for end-of-course test development can assist educators in systematic, methodical test development. The six procedural steps, which comprise this model, serve as guides for the overall process, thus minimizing team member fear or doubt about the sequential flow of what needs to be accomplished.

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APPENDICES

APPENDIX A

**PARTICIPATING TEACHER
PERMISSION SIGNATURES**

February 15, 2002

As a member of the End-of-Course Development Team for the Automated Accounting/Spreadsheets Course, I give Gregory A. Bruce permission to use my name in the writing of his thesis.

Lisa Woods Lisa Woods

Laura M McCall Laura McCall

Bill Grandstaff Bill Grandstaff

Gina Ellis Gina Ellis

Dowell Bales Dowell Bales

Ginger Hynds Ginger Hynds

Cheri Duncan Cheri Duncan

Skip McMillan Skip McMillan

Geff D. Davis Geff Davis

Shannon Hammontree Shannon Hammontree

APPENDIX B

**AUTOMATED ACCOUNTING
AND
SPREADSHEET APPLICATIONS
END-OF-COURSE TESTS**

AUTOMATED ACCOUNTING

FINAL EXAM

1. Give an example of a pointing device used with the display screen. (1.1 C)
 - A. Click
 - B. Drag
 - C. Mouse
 - D. Point

2. Pressing and holding down the left mouse button and moving the mouse is an example of:
(1.1 F)
 - A. Click
 - B. Drag
 - C. Mouse
 - D. Window

3. A bar displayed continuously on the top line of the screen, showing the menus available:
(1.2 C)
 - A. Help Window
 - B. List Window
 - C. Menu Bar
 - D. Quick Keys

4. Indicate the correct procedure for renaming a company in Peachtree. (1.2 C)
 - A. From Maintain Menu select Company Information
 - B. From Task Menu select Company Information
 - C. From File Menu select Company Information
 - D. From Edit Menu select Company Information

5. Indicate the correct procedure for setting the system date in Peachtree. (1.2 C)
 - A. From Maintain Menu select System Date
 - B. From Analysis Menu select System Date
 - C. From the Task Menu select System Date
 - D. From the Options Menu select System Date

6. Indicate the correct procedure for creating a general ledger account in Peachtree. (2.1 C)
 - A. Select Maintain . . . Chart of Accounts . . . Enter Account Information
 - B. Select Task . . . Chart of Accounts . . . Enter Account Information
 - C. Select Options . . . Enter Account Information
 - D. Select Task . . . General Journal Entry . . . Enter Account Information

7. Indicate the correct procedure for entering general journal entries in Peachtree. (2.2 C)
- A. Select Maintain . . . General Journal Entry . . . Enter Information
 - B. Select Options . . . General Journal Entry . . . Enter Information
 - C. Select Task . . . General Journal Entry . . . Enter Information
 - D. Select Reports . . . General Journal Entry . . . Enter Information
8. If you make a journal entry that is out of balance Peachtree will: (2.2 F)
- A. Automatically post it
 - B. Prompt you to correct the entry
 - C. Automatically correct it
 - D. Do nothing
9. Analyze the following transaction and choose the correct journal entry that would be made. (2.2 C)
- Billy Bob bought \$5,000 of farming equipment on account from the Farmer's Co-op.
- A. Debit Farming Equipment, \$5,000; Credit Cash \$5,000
 - B. Debit Accounts Payable-Farmer's Co-op \$5,000; Credit Farm Equipment, \$5,000
 - C. Debit Purchases, \$5,000; Credit Cash, \$5,000
 - D. Debit Farm Equipment, \$5,000; Credit Accounts Payable-Farmer's Co-op, \$5,000
10. Indicate the correct procedure for posting to the ledger in Peachtree. (2.3 F)
- A. Transfer journal entries to individual ledger accounts and calculate new balances
 - B. Amounts are posted automatically and new account balances are calculated automatically
 - C. Select Task . . . Transfer Journal Entries
 - D. Select Maintain . . . General Ledger
11. How do you post general journal accounts? (2.3 F)
- A. Click Update
 - B. Click Maintain Records
 - C. Click Post
 - D. Click Options
12. Explain the procedure for correcting a journal entry that has been posted. (2.3 C)
- A. Select Edit . . . Select the entry you want to change . . . make corrections . . . click post
 - B. Select Maintain . . . Select Journal Entry . . . make corrections . . . click post
 - C. Select Options . . . Select General Journal Entries . . . Select Correct
 - D. You cannot change a journal entry after it has been posted

13. Analyze the following transaction and choose the correct journal entry that would be made. (3.1 C)

Jane Doe, one of the owners of Treasures Gift Shop withdrew \$1,500 from the business.

- A. Debit Cash, \$1,500; Credit Accounts Payable-Jane Doe, \$1,500
 - B. Debit Accounts Payable-Jane Doe, \$1,500; Credit Cash, \$1,500
 - C. Debit Cash, \$1,500; Credit Jane Doe Withdrawal, \$1,500
 - D. Debit Jane Doe Withdrawal, \$1,500; Credit Cash, \$1,500
14. To create a six-column worksheet in Peachtree you would: (2.3 F)
- A. Select Print . . . Six-Column Worksheet
 - B. Select Reports . . . Six-Column Worksheet
 - C. Select Task . . . Six-Column Worksheet
 - D. Does not include a Six-Column Worksheet
15. Choose the correct procedure for generating a Trial Balance in Peachtree. (2.3 C)
- A. Select Reports . . . General Ledger . . . Trial Balance . . . Click Print
 - B. Select Reports . . . Accounts Payable . . . Trial Balance . . . Click Print
 - C. Select Task . . . General Ledger . . . Trial Balance . . . Click Print
 - D. Select Maintain . . . Reports . . . Trial Balance . . . Click Print
16. Which of the following statements is true concerning the Statement of Changes in Owner's Equity using Peachtree? (2.3 F)
- A. Peachtree prints this report only at the end of the fiscal year
 - B. Peachtree does not provide an option for printing this report
 - C. You must select Reports . . . Financial Statements . . . Statement of Changes in Owner's Equity . . . Click Print
 - D. You must select Task . . . Statement of Changes in Owner's Equity . . . Click Print
17. Identify the correct procedure for preparing financial statements in Peachtree. (2.3 C)
- A. Select Reports . . . General Ledger . . . Choose Statement you want . . . Click Print
 - B. Select Task . . . General Ledger . . . Choose Statement you want . . . Click Print
 - C. Select Maintain . . . Financial Statements . . . Choose Statement you want . . . Click Print
 - D. Select Reports . . . Financial Statements . . . Choose Statement you want . . . Click Print
18. How are closing entries done in an automated system? (2.3 F)
- A. Same as in a manual System
 - B. Automatically
 - C. When you click post
 - D. You must post the closing entries

19. At the end of an accounting period you should: (2.3 F)
- A. Change to the next accounting period
 - B. Journalize transactions
 - C. Enter Payroll
 - D. Pay Payroll Taxes
20. In Peachtree which option would you use to enter Sales on Account? (3.1 F)
- A. General Journal
 - B. Payments
 - C. Sales/Invoicing
 - D. Purchases/Receive Inventory
21. Indicate the correct procedure for entering a credit memo in Peachtree. (3.1 C)
- A. Enter a negative invoice in the sales/invoicing option
 - B. Enter a negative invoice in the sales/invoicing option, then apply the credit memo to a specific invoice using the receipts option, then mark both as paid
 - C. Must do credit memos separately
 - D. Enter a negative amount in the purchases/receive inventory option, then apply the credit to a specific invoice using the payments option, then mark both as paid
22. Indicate the correct procedure for entering cash sales. (5.1 C)
- A. Task . . . Receipts . . . Enter Information . . . Click Post
 - B. Task . . . Payments . . . Enter Information . . . Click Post
 - C. Maintain . . . Receipts . . . Enter Information . . . Click Post
 - D. Options . . . Sales/Invoicing . . . Enter Information . . . Click Post
23. To see all cash receipts transactions that have been made you would print a(an): (5.1 F)
- A. General Ledger
 - B. General Journal
 - C. Cash Disbursements Journal
 - D. Cash Receipts Journal
24. Indicate the correct entry for the following transaction. (3.1)
- B & S Partnership sold \$500 in merchandise plus a sales tax of \$40 on account to Joe Johnson.
- A. Debit A/R-Joe Johnson, \$540; Credit Sales \$540
 - B. Debit A/R-Joe Johnson, \$500; Credit Sales \$500
 - C. Debit A/R-Joe Johnson, \$540; Credit Sales \$500 and Sales Tax Payable \$40
 - D. Debit A/R-Joe Johnson, \$540; Credit Purchases \$500 and Sales Tax Payable \$40

25. Indicate the correct entry for the following transaction. (5.1 C)
- Biz Whiz Corp. had cash sales of \$1,000 plus \$80 in sales tax.
- A. Debit Cash in Bank, \$1,000; Credit Sales \$1,000
 - B. Debit Cash in Bank, \$1,080; Credit Sales \$1,000 and Sales Tax Payable, \$80
 - C. Debit Sales \$1,000; Credit Cash in Bank, \$1,000
 - D. Debit Sales \$1,000 and Sales Tax Payable \$80; Credit Cash in Bank \$1,080
26. Indicate the correct procedure for recording the purchase of merchandise on account. (3.1 C)
- A. Task . . . Sales/Invoicing . . . Enter Information . . . Click Post
 - B. Task . . . Payments . . . Enter Information . . . Click Post
 - C. Task . . . Purchases/Receive Inventory . . . Enter Information . . . Click Post
 - D. Task . . . Receipts . . . Enter Information . . . Click Post
27. Indicate the correct procedure for recording cash purchases of merchandise. (5.1 C)
- A. Task . . . Sales/Invoicing . . . Enter Information . . . Click Apply to Expenses . . . Click Post
 - B. Task . . . Payments . . . Enter Information . . . Click Apply to Expenses . . . Click Post
 - C. Task . . . Payments . . . Enter Information . . . Click Apply to Invoice . . . Click Post
 - D. Task . . . Sales/Invoicing . . . Enter Information . . . Click Apply to Invoice . . . Click Post
28. Indicate the correct procedure for recording payments on Account. (5.1 C)
- A. Task . . . Sales/Invoicing . . . Enter Information . . . Click Apply to Expenses . . . Click Post
 - B. Task . . . Payments . . . Enter Information . . . Click Apply to Expenses . . . Click Post
 - C. Task . . . Payments . . . Enter Information . . . Click Apply to Invoice . . . Click Post
 - D. Task . . . Sales/Invoicing . . . Enter Information . . . Click Apply to Invoice . . . Click Post
29. In Peachtree you would use the account, "Purchase Returns and Allowances" when: (3.1 C)
- A. You record a debit memo for damaged supplies
 - B. You record a debit memo for damaged equipment
 - C. You record a debit memo for damaged merchandise
 - D. You do not use Purchase Returns and Allowances in Peachtree
30. To see only transactions for which cash has been spent, you would print a(an): (5.1 F)
- A. General Journal
 - B. General Ledger
 - C. Cash Disbursements Journal
 - D. Purchases Journal

31. Analyze the following transaction and choose the correct entry that would be made. (3.1 C)

Purchases \$5,000 in Merchandise on Account from Wholesalers Unlimited.

- A. Debit A/P-Wholesalers Unlimited \$5,000; Credit Cash \$5,000
- B. Debit Purchases \$5,000; Credit A/P-Wholesalers Unlimited \$5,000
- C. Debit A/P-Wholesalers Unlimited \$5,000; Credit Purchases \$5,000
- D. Debit Purchases \$5,000; Credit Cash \$5,000

32. Analyze the following transaction and choose the correct entry that would be made. (5.1 C)

Made payment of \$2,450 to Office Depot in payment of the \$2,500 account balance less a 2% cash discount of \$50.

- A. Debit A/P-Office Depot \$2,500; Credit Cash in Bank \$2,450 and Purchase Discount \$50
- B. Debit A/P-Office Depot \$2,450; Credit Cash in Bank \$2,450
- C. Debit A/R-Office Depot \$2,500; Credit Cash in Bank \$2,450 and Purchase Discount \$50
- D. Debit A/R-Office Depot \$2,450; Credit Cash in Bank \$2,450

33. Which of the following would you choose from the Maintain Menu to set up a new customer account? (2.1 F)

- A. Chart of Accounts
- B. Vendors
- C. Company Information
- D. Customers/Prospects

34. Which of the following would you choose from the Maintain Menu to set up a new vendor record? (2.1 F)

- A. Chart of Accounts
- B. Vendors
- C. Company Information
- D. Customers/Prospects

35. Using Peachtree which of the following would be the correct procedure to follow for recording adjusting entries? (3.3 C)

- A. Print a Working Trial Balance . . . Enter Adjustments using the Adjustments Option . . . Click Post
- B. From the Maintain menu select Adjustments . . . Enter Adjustments . . . Click Post
- C. Print Working Trial Balance . . . List any necessary adjustments on the Working Trial Balance . . . From the Task Menu select General Journal Entry . . . Enter Adjusting Entries . . . Click Post
- D. Adjusting entries are entered automatically

36. In Peachtree which of the following accounts should you use to make an adjustment to Merchandise Inventory? (5.2 F)
- A. Income Summary
 - B. Merchandise Adjustment
 - C. Retained Earnings
 - D. Inventory Adjustment

37. Analyze the following information and determine the correct adjusting entry using Peachtree. (5.2 C)

On the trial balance merchandise inventory has a balance of \$49,205.
The actual cost of ending inventory is \$45,669.

- A. Debit Income Summary \$3,536; Credit Merchandise Inventory \$3,536
 - B. Debit Inventory Adjustment \$3,536; Credit Merchandise Inventory \$3,536
 - C. Debit Income Summary \$45,669; Credit Merchandise Inventory \$45,669
 - D. Debit Inventory Adjustment \$45,669; Credit Merchandise Inventory \$45,669
38. Analyze the following information and determine the correct adjusting entry using Peachtree. (3.3 C)

On the trial balance the supplies account balance is \$3,027.
The actual cost of supplies on hand at month's end is \$619.

- A. Debit Supplies Expense \$2,408; Credit Supplies \$2,408
 - B. Debit Supplies Expense \$619; Credit Supplies \$619
 - C. Debit Supplies \$2,408; Credit Supplies Expense \$2,408
 - D. Debit Supplies \$619; Credit Supplies Expense \$619
39. Indicate the correct procedure for printing an Income Statement in Peachtree. (3.3 C)
- A. Task . . . Financial Statements . . . Income Statement . . . Print
 - B. Maintain . . . Financial Statements . . . Income Statement . . . Print
 - C. Reports . . . General Journal . . . Income Statement . . . Print
 - D. Reports . . . Financial Statements . . . Income Statement . . . Print
40. What is the difference between changing an accounting period and closing a fiscal year? (5.2 F)
- A. You change an accounting period semi-annually and close a fiscal year annually
 - B. You change an accounting period when you move from one month to another and you close a fiscal year at the end of a calendar or fiscal year
 - C. You change an accounting period quarterly and you close a fiscal year annually
 - D. There is no difference

41. What should you do before closing a fiscal year? (3.3 F)
- A. Change the Fiscal Year
 - B. Audit the Books
 - C. Back up all files
 - D. Don't do anything
42. Choose the correct procedure for closing the fiscal year. (5.2 C)
- A. Task . . . System . . . Close Fiscal Year
 - B. Task . . . General Journal . . . Close Fiscal Year
 - C. Maintain . . . System . . . Close Fiscal Year
 - D. Maintain . . . General Journal . . . Close Fiscal Year
43. Which option from the Maintain Menu would you choose to add new inventory items? (3.2 F)
- A. Inventory Items
 - B. Chart of Accounts
 - C. Vendors
 - D. Customers/Prospects
44. How do you generate inventory reports in Peachtree? (3.2 F)
- A. Select Reports from the Analysis Menu
 - B. Select Reports from the Task Menu
 - C. Select Inventory from the Reports Menu
 - D. Select Inventory from the Task Menu
45. Indicate the correct method to record depreciation for fixed assets in Peachtree. (4.1 C)
- A. Select Purchases/Receive Inventory from the Task Menu
 - B. Select General Journal Entry from the Task Menu
 - C. Select General Journal Entry from the Maintain Menu
 - D. Select Inventory Adjustments from the Task Menu
46. Analyze the following transaction and choose the correct answer. (4.3 C)
- Depreciation for office equipment is \$3,000.
- A. Debit Accumulated Depreciation-Office Equipment \$3,000; Credit Depreciation Expense-Office Equipment \$3,000
 - B. Debit Depreciation Expense-Office Equipment \$3,000; Credit Accumulated Depreciation-Office Equipment \$3,000
 - C. Debit Office Equipment \$3,000; Credit Accumulated Depreciation-Office Equipment \$3,000
 - D. Debit Depreciation Expense-Office Equipment \$1,500; Credit Accumulated Depreciation-Office Equipment \$1,500

47. Choose the correct procedure for setting up payroll information for employees in Peachtree. (6.1 C)
- A. Maintain . . . Vendor . . . Enter Information . . . Save
 - B. Task . . . Employees/Sales Reps . . . Enter Information . . . Save
 - C. Options . . . Employees/Sales Reps . . . Enter Information . . . Save
 - D. Maintain . . . Employees/Sales Reps . . . Enter Information . . . Save
48. Which option would you choose from the task menu to process employees' payroll? (6.2 F)
- A. General Journal Entry
 - B. Payments
 - C. Sales/Invoicing
 - D. Payroll Entry
49. Which of the following would you print to obtain payroll information? (6.2 F)
- A. General Journal
 - B. Sales Journal
 - C. Cash Disbursements Journal
 - D. Payroll Register
50. In our edition of Peachtree you must enter the Payroll tax liabilities using: (6.2 F)
- A. Payments option from the Task Menu
 - B. General Journal Entry option from the Task Menu
 - C. Receipts option from the Task Menu
 - D. Sales/Invoicing option from the Task Menu

Spreadsheet Applications Final

1. An equation that calculates a new value from existing cell values within the spreadsheet is a(n) (1.1 F)
 - a. cell reference
 - b. formula
 - c. function
 - d. operator
2. A formula always begins with a(n) (2.1 F)
 - a. =
 - b. >
 - c. +
 - d. *
3. _____ is not a valid operator for use in a formula. (2.1 F)
 - a. +
 - b. *
 - c. %
 - d. ^
4. Which of the following is a valid formula? (2.1 C)
 - a. =C4*(D4+H9)/F5
 - b. =@C4*(D4+H9)/F5
 - c. =C4*(D4+H9))/F5
 - d. @C4*(D4+H9))/F5
5. Spreadsheets evaluate operators in formulas beginning with parentheses. Analyze the following and indicate which is the correct order of operation: (2.1 C)
 - a. addition and subtraction, followed by any multiplication or division operations
 - b. exponentiation, followed by any multiplication or division operations, and finally, addition or subtraction
 - c. multiplication or division, followed by any addition and subtraction
 - d. addition and subtraction, followed by any division and multiplication, and finally exponentiation
6. If cell C4 contains 25, cell D6 contains 5, and cell F12 contains 25, the formula =F12+C4/D6 would yield (2.1 C)
 - a. 105
 - b. 30
 - c. 10
 - d. .10
7. To copy a formula in cell E6 to the range E7:E13, select cell E6, position the mouse pointer on the _____ and drag through the range E7:E13. (2.3 C)
 - a. drag handle
 - b. fill handle
 - c. Copy button
 - d. Paste button
8. The _____ function is used to display the largest value in a range. (2.4 F)
 - a. SORT
 - b. SUM
 - c. MAX
 - d. LARGEST

9. If you see a value such as 1,234,567.00 it is in _____ format. (2.5 C)
- Comma
 - Currency
 - Dollar
 - Percent
10. Using the Percent format, the number .1309719 displays as _____. (2.5 C)
- .13%
 - .1309719%
 - 13.10%
 - 13.09719%
11. You can add color to the spreadsheet title by choosing _____ command on the shortcut menu. (3.1 F)
- Clear
 - Color and Background
 - Edit Titles
 - Format
12. Print Preview allows you to _____. (5.1 F)
- edit the contents of cells
 - print the page
 - reduce the size of the spreadsheet for printing on one page
 - see the exact layout of you printed report prior to actually printing the report
13. To return to the spreadsheet from the Print Preview window, click the _____. (5.1 F)
- Close button
 - Next button
 - Previous button
 - Zoom button
14. When an entire spreadsheet will not print across an 8 1/2 inch wide page, one of your options to fit the spreadsheet on a single page is to _____. (5.2 C)
- change the size of the font to a larger size
 - print the report in landscape orientation
 - print the report in portrait orientation
 - sort the columns into a different sequence
15. In the formula =C6*5, the cell reference is _____. (1.1 F)
- =
 - C6
 - *
 - 5
16. When dragging the column border to change the width of a column, the mouse pointer changes to _____. (1.3 F)
- a dark block plus sign
 - a dark plus sign with arrowheads on the vertical line
 - an hourglass
 - two vertical lines with arrow heads on the left and right sides and the word ADJUST below it

17. To change the width of a column on a spreadsheet, _____. (1.3 F)
- choose the Column command on the Format menu
 - choose the Column Width command on the Standard toolbar
 - drag the column border between the column heading to the new location
 - press Enter twice
18. Cell I10 contains the formula $=\text{ROUND}(B3*B4,0)+A1$. If A1 contains 5.56, B3 contains 10, and B4 contains 2, the value Excel displays in the cell is _____. (2.1 C)
- 15.56
 - 5.56
 - 26.00
 - 25.56
19. To round the number 2.15 to a whole number, use _____. (2.1 F)
- $=\text{ROUND}(0,2.15)$
 - $=\text{ROUND}(2.15,0)$
 - $=\text{ROUND}(2.15,1)$
 - $=\text{round}(2.15,1)$
20. If $=A15$ displays in the formula bar of cell A1, the following is not true (2.0 C)
- A15 is an absolute cell reference
 - A15 is a relative cell reference
 - it is a valid formula
 - the contents of cell A15 are copied into cell A1
21. When using a relative cell reference _____, (1.3 F)
- the cell reference will change when the formula is copied to other cells
 - the cell reference will not change when the formula is copied to other cells
 - the value in the cell will never change
 - the value in the cell will never change when the formula is copied to other cell
22. Adding _____ to selected rows of the spreadsheets enhances the appearance of the spreadsheet. (3.1 F)
- color
 - symbols
 - text
 - numbers
23. To freeze column headings on a spreadsheet, select the Freeze Panes command on the _____ menu. (1.4 F)
- Edit
 - Format
 - Tools
 - Window
24. To unfreeze titles click the _____ command on the Window menu. (1.4 F)
- Freeze Panes
 - Remove Freeze Panes
 - Panes
 - Unfreeze Panes

25. The intersection of each column and row is a _____. (1.1 F)
- row
 - label
 - cell
 - column
26. Horizontal and vertical lines on the spreadsheet itself are called _____. (1.1 F)
- gridlines
 - gridlock
 - gridlabels
 - gridbars
27. The _____ contains buttons that allow you to perform frequent tasks more quickly than using the menu bar. (1.2 F)
- formula bar
 - menu bar
 - toolbar
 - status bar
28. To enter data into a cell, you must _____ the cell. (1.2 C)
- select
 - format
 - outline
 - view
29. Excel positions text _____ in the selected cell. (1.3 F)
- right-aligned
 - left-aligned
 - non-aligned
 - center-aligned
30. Excel enters numbers _____ in the cells. (1.3 F)
- right-aligned
 - left-aligned
 - non-aligned
 - center-aligned
31. You can use the _____ button on the toolbar to sum numbers. (4.1 C)
- AutoAdd
 - AutoSum
 - Add
 - AutoCalculate
32. A _____ is a block of adjacent cells in a spreadsheet. (2.4 F)
- block
 - grouping
 - range
 - group

33. The easiest way to copy a function from one cell to many cells is to use the _____. (1.3 F)
- fill row
 - fill columns
 - fill cells
 - fill handle
34. The purpose of formatting a spreadsheet is to _____. (1.3 F)
- emphasize certain entries
 - make the spreadsheet attractive
 - make the spreadsheet easy to read
 - all of the above
35. To center a spreadsheet title, use the Alignment command on the _____ menu. (2.3 F)
- Format
 - File
 - Tools
 - Edit
36. Indicate the command you would choose from the Format Menu to change the size of the text. (2.2 F)
- Resize
 - Patterns
 - Font
 - Size and Style
37. AutoFormat automatically sets the _____. (1.3 F)
- alignment
 - fonts
 - patterns
 - all of the above
38. Indicate the feature which changes column width to accommodate the numbers in each of the columns. (1.3 C)
- AutoWidth
 - AutoFit
 - AutoFormat
 - AutoRow
39. To change the size of a column, use the Column width command on the _____ menu. (1.3 F)
- Format
 - Edit
 - Insert
 - Tools
40. By default, the Comma format places _____ digits to the right of the decimal point. (2.2 F)
- three
 - two
 - one
 - four

41. A _____ is a graphical representation of the data in the spreadsheet. (5.3 F)
- view
 - chart
 - report
 - drawing
42. Indicate the key you would use to erase back to the error so you can type the correct characters. (2.5 C)
- backspace
 - esc
 - arrow
 - tab
43. To clear the contents of a cell, select the cell and then press the _____ key. (2.5 F)
- delete
 - esc
 - end
 - ctrl
44. Which organization is associated with business professionals? (6.7 F)
- DECA
 - FCCLA
 - FBLA
 - FFA

Questions 45-49: Refer to Spreadsheet I. (4.1 C)

45. What is the formula for E3?
- =E2-C3+D3
 - =C3+E2-D3
 - =D3-E2+C3
 - =E2+C3-D3
46. What is the formula for E10?
- @E9-C10+D10
 - =E9-C10+D10
 - @C10-E9+D10
 - =C10-E9+D10
47. What is the formula for C13?
- =C2+C3-C4+C12
 - =MAX(C2:C12)
 - =SUM(C2:C12)
 - =C2:C12
48. If cell D11 is changed to \$3,000.00 what will the balance in cell E11 be?
- \$30,100.00
 - \$12,000.00
 - \$10,000.00
 - \$10,300.00

49. What will the number in D13 be if the above change is made?
- \$5,000.00
 - \$9,300.00
 - \$4,000.00
 - \$4,855.00

Questions 50-52: Refer to Spreadsheet 2. (2.3 C)

50. What will appear in cell A3 if the cells are filled down?
- 100
 - 250
 - 300
 - 350
51. What will appear in cell A4 if the cells are filled down?
- 100
 - 250
 - 300
 - 350
52. What will appear in cell C2 if the cell is filled down?
- 100
 - 250
 - 300
 - 350

Questions 53-56: Refer to Spreadsheet 3. (4.1 C)

53. What is the formula for E8?
- @D6+D7
 - =D6-D7
 - =D6+D7
 - =D7-D6
54. What is the formula for E12?
- =E8+E11
 - =D9+D10
 - =E8-D10
 - =E8-E11
55. What is the formula in cell E21?
- =SUM(D18:D20)-SUM(D15:D17)
 - =SUM(D15:D17)-SUM(D18:D20)
 - =E12+D15+D16-D17
 - =E12-D15-D16+D17
56. What is the formula in cell E22?
- =E12-E21
 - =E12+E21
 - =E8+E21
 - =E8-E21

Spreadsheet 1

	DATE	PAYEE	CHEQUE	DEPOSIT	BALANCE
2	01-Jan	Balance Fwd.			10,000.00
3	03-Jan	Payroll		2,000.00	12,000.00
4	05-Jan	Safeway	150.00		11,850.00
5	06-Jan	Canadian Tire	32.00		11,818.00
6	06-Jan	Esso	18.00		11,800.00
7	10-Jan	Safeway	55.00		11,745.00
8	12-Jan	School	145.00		11,600.00
9	13-Jan	John Smith	2,150.00		9,450.00
10	15-Jan	Rev. Canada	2,150.00		7,300.00
11	15-Jan	Payroll		2,000.00	9,300.00
12	18-Jan	B.C. Tel	155.00		9,145.00
13			\$ 4,855.00	\$ 4,000.00	

Spreadsheet 2

	A	B	C	D	E
1	150		100		
2	200				

Spreadsheet 3

	A	B	C	D	E
	Joe's Computer Store				
	Income Statement				
	For Period Ending December 31, 1996				
5	SALES				
6	Hardware Sales		\$	147,552.32	
7	Software Sales			84,523.45	
8	Gross Sales		\$	232,075.77	
9	Sales Returns			5,203.65	
10	Sales Discounts			4,704.55	
11					9,908.20
12	Net Sales		\$	222,167.57	
13	COST OF GOODS SOLD				
15	Beginning Inventory			55,025.32	
16	Add: Purchases			142,058.32	
17	Add: Transportation			4,023.25	
18	Less: Purch. R&A			4,025.32	
19	Less: Purch Disc.			3,256.00	
20	Less: End Inventory			67,852.32	
21	Net Cost of Goods Sold			125,973.25	
22	GROSS MARGIN		\$	96,194.32	

VITA

Gregory A. Bruce was born in Harriman, Tennessee in 1962. Mr. Bruce is the oldest child of Olen R. Bruce and Joyce O. Bruce. In September of 1980, Mr. Bruce entered Tennessee Technological University with a major in Accounting. In January of 1982, Mr. Bruce transferred to the University of Tennessee, Knoxville and received a Bachelor of Science Degree in Business Administration in June of 1985. In May of 1995, Gregory A. Bruce and Kristye Y. Raby were married in Knoxville, Tennessee, where they currently reside. Mr. Bruce was accepted into the University of Tennessee, Knoxville, Graduate School in April of 2001 to aim for a Teaching License in Business Education and a Master of Science Degree in Human Ecology. This thesis is the final requirement to complete the Master of Science Degree. During the 2001-2002 Knox County, Tennessee, school year, Mr. Bruce trained and participated as an intern in the Business Education Department at Gibbs High School. Mr. Bruce intends to stay and work in the Knoxville, Tennessee area as a secondary teacher and a baseball and/or basketball coach.