

An Analysis of Authentic Assessment in an Information Technology Networking Course
at WCTC

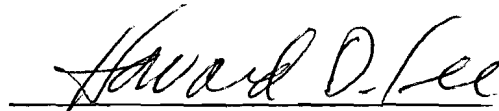
By

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A handwritten signature in cursive script that reads "Howard D. Lee". The signature is written in black ink and is positioned above a horizontal line.

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ABSTRACT

Researchers have debated the positive and negative impacts of standard paper and pencil test vs. the use of authentic or performance-based assessment methods. Many courses at Waukesha County Technical College implement authentic assessment methods, however; courses in the Information Technology Network Specialist program lack implementation of authentic assessment methods. The purpose of this study was to evaluate the effectiveness of authentic assessment methods used in the Introduction to Networking course at WCTC. Results of the study showed that authentic assessment is beneficial to measuring competency. The study also found that there is little to no difference between gender, age, or education level in respect to their perceptions of authentic assessment. Additional findings of the study show the positive and negative perceptions of authentic assessment as well as the differences in perceptions about

authentic assessment prior to and upon completion of the Introduction to Networking course at WCTC.

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Chapter I: Introduction

Instructors often ask themselves, “Did our students learn anything today”? Evaluators often ask, “Did they learn what we intended for them to learn today” (Kelsey, 2001, p. 4)? These are difficult questions to answer; however, appropriate assessment methods may be the best way to ensure that students are learning what was intended for them to learn. Appropriate assessments force students to think critically and demonstrate a thorough understanding of what they have been taught (Sternberg, 2004).

One way to address the issue of appropriate evaluation is to implement authentic assessment methods in the classroom. Grant Wiggins (1990), a researcher and consultant on school reform issues defines authentic assessment as “examining student performance on worthy intellectual tasks” (p. 2). Wiggins’s article continues to compare authentic assessment to traditional or conventional testing methods in order to help educators and scholars understand what authentic assessment is. He indicates that authentic assessments require students to perform their acquired knowledge rather than show if a student can “plug in” what s/he has learned or memorized out of context. He criticizes the use of paper and pencil tests because they don’t challenge students to think about the larger context of what has been learned. He asserts that authentic assessments force students to establish polished, thorough and justifiable answers rather than selecting from or writing correct responses without thinking about the reasoning behind their answers. Wiggins (1990) also states that authentic assessments are more valid and reliable because they emphasize and standardize appropriate criteria for scoring varied products where there are multiple correct answers depending on the context of the assessment. Traditional

tests, on the other hand, standardize objective items in order to achieve only one correct answer.

Many of today's educational specialists are in agreement that standard assessment methods are not the best way to measure student performance (Allen, 2005; Williams, 2005). Standard assessments are methods of testing student learning that use paper and pencil testing methods such as multiple choice, true/false, completion, or short answer questions (Montgomery, 2002). Also, variety of assessment strategies in a professional education program allows students to display a greater depth and breadth of learning (Williams, 2005). Assessment should relate to both theory and practice in order to reflect reality and also be meaningful to the individual student. Assessment is sometimes viewed as the end result of education. However, the best educational practices use assessment in a continual process (Wetzel, 2005). Educators should make sure that the way students are assessed corresponds to the type of academic learning behaviors being assessed (Allen, 2005).

Many educators agree on the importance of using a variety of authentic assessment techniques in the classroom, but the reality is that the implementation can be a daunting task. In order to help educators take steps toward implementing authentic assessment, it is important to keep in mind that assessment is the collection and evaluation of evidence of student learning, focusing on indicators of meaningful and valuable student progress (Corcoran, Dersheimer, & Tichenor, 2004). One of the ways to address the scoring of authentic assessment tasks is through the use of rubrics. Rubrics can help with the challenging task of assigning grades. The letter grades used in the reporting systems at most colleges and universities can be made compatible with the

numbers or words used in rubrics to describe the proficiency levels presented (Montgomery, 2002).

Weber and Stewart (2001) outline the benefits of authentic assessment. They state that authentic assessment encourages educators to change their curriculum and teaching techniques by eliminating curriculum that puts its focus solely on preparing students for a standardized test. On the other hand, authentic assessments respond also positively to “teaching to the test” since educators are able to focus curriculum and instruction on evaluating student performance in performance-based tests. Authentic assessments also give educators a better understanding of the student’s performance in a course. Another benefit of authentic assessment is the involvement that teachers are able to have in the learning process as they create and administer assessments providing a more active role in the scoring process.

Montgomery *et al.* (2002) address some constraints that need to be considered in the implementation of authentic assessment. One of these constraints indicates that authentic assessment strategies are often costly when it comes to the additional time investment needed to assess students with alternate assessment methods. This is especially the case in general education classes where there are large numbers of students that need to be assessed and evaluated (Meadows, Kyal, & Wright, 1998, Bracey, 1993). The learning and comprehension level of students can indicate a lack of experience and skill in responding to the application-based assessments (Liftig, Liftig, & Eaker, 1992). Language barriers also can create inequity when administering authentic assessment (Spinelli, 1998). Finally, there is a concern that increased validity of authentic assessment

is often associated with a decrease in reliability (Riley & Stern 1998, Rudner, 1993, Bowers, 1989).

Educational institutions continue to seek the most valid and reliable way to assess students. Appropriate assessment has been a struggle for educators, especially with today's standards-driven curriculum (DeCastro-Ambrosetti & Cho, 2005). The public education system in the State of Wisconsin strives for "Quality Education to Every Child" through their New Wisconsin Promise initiative. The State of Wisconsin Department of Public Instruction continues to integrate authentic assessment into the curriculum that higher education institutions use to educate new teachers (Wisconsin Department of Public Instruction, 2006).

The Technical College System in the State of Wisconsin also includes authentic assessment or performance-based assessment in the certification requirements of its instructors. According to the Wisconsin Technical College System (WTCS) curriculum and course construction outcome summary for course #50, instructors in the Wisconsin Technical College System are required to learn appropriate methods for creating assessments. This includes creating performance-based assessments that are application-based and focus on real world tasks as well as assessments that have learners actually doing real world tasks such as develops products and applying decision-making skills. Instructors are also taught to implement rubrics that include criteria, ratings, a rating scale and minimum requirements (WTCS, 2006).

Waukesha County Technical College is one of 16 two-year technical colleges in the Wisconsin Technical College System. Located in Pewaukee, WCTC focuses on technical education, occupational training, and enrichment programs. WCTC is

committed to student learning for the enhancement of the community's quality of life. This commitment includes a dedication to continuous improvement and has resulted in a decision to subscribe to the AQIP certification process, an ongoing process of systemic quality improvement. WCTC was also accredited in 2000 by the Higher Learning Commission (HCL) and is a member of the North Central Association of Colleges and Schools (Waukesha County Technical College, 2006). WCTC offers over 100 fields of study in business, interior design, education, human services, electronics, hospitality, culinary arts, nursing, printing, graphics, protective services, and other skilled trades.

The Information Technology department at WCTC offers three degree programs: Computer Support Specialist, Programmer/Analyst, and Network Specialist. The 20 required courses in the IT Network Specialist degree are using a variety of standard assessment methods that include multiple-choice, true/false, completion, and short answer tests.

William Babler, Instructional Development Specialist at WCTC, has the opportunity to review the curriculum projects of the instructional faculty. Since 2003, he has seen approximately 75-80% of the newly designed courses implement performance-based assessment, but he feels that "more instructional faculty need to implement authentic assessment in their curriculum (W. Babler, personal communication, February 9 and 15, 2006)."

Statement of the Problem

Although instructors in the Wisconsin Technical College System are educated on the importance of authentic assessment, many instructors at Waukesha County Technical College (WCTC) are not implementing authentic assessment methods in their

classrooms. Currently, only standard testing methods are used in the Information Technology (IT) Network Specialist curriculum at WCTC. With the growing popularity and success of alternative assessment methods, the IT Networking Specialist curriculum should consider expanding its assessment procedures to include more authentic testing methods.

Purpose of the Study

The purpose of this study is to evaluate the effectiveness of authentic assessment methods used in the Introduction to Networking course at WCTC.

Research Questions

This study will attempt to answer the following research questions:

1. What are the advantages of authentic assessment in measuring competency by students in the Introduction to Networking course by students at WCTC?
2. Are there differences in the perception of authentic assessment by students based on selected demographic factors in the Introduction to Networking course at WCTC?
3. What are the positive and negative perceptions of authentic assessment by students in the Introduction to Networking course at WCTC?
4. Is there a difference in perceptions about authentic assessment by students prior to and upon completing the Introduction to Networking course at WCTC?

Importance of Topic

Research has shown that authentic assessment or performance-based assessment methods which prove a student's ability to apply what they are learning is the most appropriate way to assess student learning (WTCS, 2006). According to William Babler,

Instructional Development Specialist at WCTC, of the 100+ funded curriculum projects evaluated since 2003; approximately 75-80% of the courses are using performance-based assessment methods (W. Babler, personal communication, February 9, 2006). As a part of the Wisconsin Technical College System that endorses performance-based assessment, Mr. Babler “would like to see 100% of the courses at WCTC using performance-based assessment.” (W. Babler, personal communication, February 15, 2006). Of the many courses that have implemented authentic assessment methods at WCTC, no study has been done to show if these methods are effective.

Limitations of Study

This sample was restricted to the evaluation of one course at WCTC, Introduction to Networking. The study was not able to sample all courses at WCTC to show the effectiveness of authentic assessment. This study was limited to one instructor teaching the Introduction to Networking course. It does not show the effectiveness of authentic assessment when implemented by different instructors teaching the same course. The study was based on newly-created curriculum that had not been previously implemented or tested in the classroom. This newly created curriculum will implement authentic assessment to the best of the instructor’s ability. The study is limited to the student’s attitudes about the effectiveness of authentic assessment. It does not use grades as a way to measure effectiveness of assessment methods.

Definition of Terms

The following terms are defined for the purpose of this study:

Authentic assessment: A testing method that examines student performance on worthy intellectual tasks (Wiggins, 1990).

Conventional assessment methods: See Traditional assessment methods.

Curriculum: All the courses of study offered by an educational institution (American Heritage Dictionary, 2000).

New Wisconsin Promise Initiative: Introduced by Wisconsin State Superintendent of Schools Elizabeth Burmaster. It is the Wisconsin Department of Public Instruction's initiative to ensure a future of quality education of all the children of Wisconsin ("Burmaster Reports on State of Education," 2003).

Performance-based assessment: Methods of assessing student learning that require learners to apply knowledge, skills, or attitudes to hypothetical or real life/work tasks or to perform a task, develop a product, make a decision or solve a problem (WTCS, 2006). Performance-based assessment is a type of authentic assessment.

Rubric: A scoring tool that lists the criteria for a piece of work. Rubrics specify the level of performance expected for several levels of quality. These levels of quality may be written as different ratings which are then added up to form a total score which then is associated with a grade (Goodrich, 1996/1997).

Standard assessment methods: See Traditional assessment methods.

Traditional assessment methods: Methods of testing student learning that use paper and pencil testing methods like multiple choice, true/false, completion, or short answer questions (Montgomery, 2002). These assessment methods are used in many standardized tests and questionnaires.

Chapter II: Review of Literature

The purpose of this study was to evaluate the effectiveness of authentic assessment methods used in the Introduction to Networking course at WCTC. The work of Wiggins and others has put the topic of classroom assessment into the forefront of education reform. This reformation has continued to make the case for the use of authentic assessment measures vs. the use of standard paper and pencil tests (Wiggins, 1990; Allen, 2005; Williams, 2005, Montgomery, 2002, Sambell, McDowell & Brown, 1997). In order to better understand the impact of authentic assessment in the Computer Networking program at WCTC, the following issues need to be addressed: the need for fair testing measures, assessment and its role in student learning, the negative impact of standard testing measures and the role of students in the assessment process.

The Need for Fair Testing Measures

A common goal among educators is the need for fair testing measures and the desire to create tests that will produce accurate results. Sawin (2005) asks, “How can a teacher best obtain evaluation results that will be accurate and trustworthy” (p. 1)? In order to create good tests, test makers should look beyond a group of questions that have been based on content theories. They should seek evidence that the test is valid and that it truly measures what it was intended to measure (Sawin, 2005).

Others have worked to achieve this goal including the National Center for Fair and Open Testing (FairTest). One of the projects of FairTest included organizing a group of education and civil rights organizations in 1995 to make changes to assessment practices used in the United States (National Forum on Assessment, 1995). This National Forum on Assessment drafted the Principles and Indicators for Student Assessment

Systems. The Forum believes that “powerful, fair assessment methods used by skilled educators are necessary for educating all our children to high standards” (National Forum on Assessment, 1995, p. 3). Educators also seek to create a level playing field where all students can be assessed fairly by giving consideration to the student’s instruction context as well as their background. Assessment should be individualized in order to be implemented using a range of assessment approaches in order to minimize bias (Lam, 1995). He further states:

Assessment for its intended purpose is unfair if 1) students are not provided with equal opportunity to demonstrate what they know (e.g., some students were not adequately prepared to perform a type of assessment task) and thus the assessments are biased; 2) these biased assessments are used to judge student capabilities and needs; and 3) these distorted views of the students are used to make educational decisions that ultimately lead to limitations of educational opportunities for them (Lam, 1995, p. 1).

Winking (1997) also speaks to the importance of equity in assessment. She states that if American students are to be held responsible for achieving high educational standards, educators need to be held to developing assessment strategies that ensure equity in assessing and interpreting student performance. Furthermore, alternative or performance-based assessments are the answer to the narrowing the performance gap between students of different ethnic, socioeconomic, and language backgrounds.

Research also indicates that students feel that assessments should be fair. A study conducted by Sambell, McDowell, & Brown (1997) concluded that “assessment has a positive effect on their learning and is fair when it relates to authentic tasks, represents

reasonable demands, encourages application of realistic contexts, emphasizes the need to develop a broad range of skills and is perceived to have long-term benefits” (p. 365). A way to achieve these assessment goals is to use authentic assessment methods.

Assessment and its role in student learning

The National Forum on Assessment (1995) also feels strongly about the role of assessment in the student learning process. This organization feels that assessment is an essential part of the learning process. In order to help students, an assessment system should use “methods that are compatible with how different students, learn, provide information on how each student learns, and offer a variety of methods and opportunities for demonstrating achievement.” (p. 5) Furthermore, assessment systems should use methods that follow the learning goals, curriculum, instruction and current knowledge of student learning. These assessments should be evaluated on a regular basis to be sure that they are truly enhancing the student learning experience (National Forum on Assessment, 1995). The Forum states:

Classroom assessment is the primary means through which assessment affects learning. It is integrated with curriculum and instruction so that teaching, learning and assessing flow in a continuous process. By documenting and evaluating student work over time, teachers obtain information for understanding student progress in ways that can guide future instruction. Assessment also provides opportunities for self-reflection and evaluation by the student. (p. 6)

Negative assessment experiences can also have an impact on the future learning experiences. Struyven, Dochy and Janssens (2005) argue that assessment has a large impact on student learning. Student learning is also directly related to the way a student

thinks about learning and studying as well as affecting the way that he/she takes on assignments and evaluations. The assessment and evaluation experiences also have an impact on how a student approaches future learning experiences. In order to make a positive impact on the learning experience, it is necessary for educators to implement assessments that foster a positive learning experience.

Sambell, McDowell, & Brown (1997) also drew conclusions relating to assessment and its effect on the learning process. Their study found that students reacted negatively when they referred to 'normal' or traditional assessments. Their feedback indicated traditional assessments had a negative impact on the learning process and that standard paper and pencil exams do little to help a student understand the subject matter. Conversely, students perceived alternative assessments forced students to understand content matter rather than memorize.

Standard assessment and its negative impact

Wiggins (1990) has a strong belief in authentic testing measures and speaks honestly about the negative impact of standard assessment. He feels that it is the way that standard tests are structured, not the content that negatively impacts learning. The validity of standard testing should not be the focus of the assessment reformation. Students learn to connect assessment with cramming. Teachers learn that the assessments are composed of questions that are disconnected to the original intent of the learning process. Therefore, both teachers and students learn that correct answers are more important than learning.

Of the many types of standard testing measures, multiple-choice tests are a very popular choice among educators. The National Center for Fair and Open Test Testing addresses the negative impacts of multiple-choice tests as they question the objective

nature of this type of testing. Makers of multiple-choice tests feel they are creating objective tests because there is no human judgment in the scoring process. In reality, these objective tests are really subjective because it is humans that are deciding what questions to ask or how to phrase the questions. These are really subjective decisions that are biased and can ultimately help some test-takers and hurt others (National Center for Fair and Open Testing, 1995).

Assessment can be a daunting task due to the size of some college classrooms. Therefore, many educators choose to take the easy route of using traditional, standard tests because they are easy to administer and correct. It is authentic tasks and rubrics that give a better measurement of the application of products and processes as well as a connection to the real world where problem-solving and critical thinking are necessary in order to succeed (Montgomery, 2002).

The role of students in the assessment process

There are many 'stakeholders' in the assessment process including: instructors, curriculum developers, university executives, as well as the community of employers that will hire students. McDowell & Sambell (1999) suggest that student's viewpoints should be considered when making choices about assessment methods to be used in the classroom. The student role in the assessment process is based on the purpose of assessment defined by Atkins *et al.* (1993):

To establish the level of achievement reached at the end of a course or unit; to establish progress on a course or unit and give feedback on it; to diagnose strengths and weaknesses leading to remedial action or to extension learning if needed; to consolidate work done so far—a learning experience in itself; to

motivate students; to predict a student's likely performance level in the future; to determine whether a student is 'safe to practice'; to select for entry to further training, employment, etc.; to conform to the requirements of external regulatory bodies; to give individual staff feedback on the effectiveness of their teaching; to determine the extent to which course aims have been reached; to obtain information on the effectiveness of the learning environment; to monitor standards over time (p. 8-9).

McDowell & Sambell (1999) indicate that student surveys are often used by universities to determine the effectiveness of services, facilities, and teaching, but student's viewpoints are not as likely to be consulted when assessment issues are at hand. Students are not trained in the assessment process. They don't understand the pedagogy of assessment methods and they don't have the expertise to determine the type of questions that are asked on an assessment or how to score the assessments. Students might also look toward assessments that are easy and would give them the highest grade rather than putting a focus on valid and reliable assessments. On the other hand, a study conducted by Nichols and Smith (1996) found that students desire assessments to be interesting, challenging and a good vehicle for learning as well as well-organized, clear, fair and consistent. Hinett and Knight (1996) also found that students value assessments that give clear instructions, promote real learning and give feedback to help determine what was done wrong. McDowell & Sambell (1999) state that objectivity is yet another concern when it comes to involving students in the assessment process as they are the ones being evaluated. How can students be objective in assessing themselves?

The study by McDowell & Sambell (1999) conducted a series of 13 case studies across one university focusing upon different instances of assessments that are being used. There was an increased focus on 'alternate' forms of assessment for example: group projects, self, peer and collaborative assessment, oral assessment, profiling, and poster assessment.

There were three main conclusions that came from this study. First, the data collected indicates that students are able to address the assessment process with maturity and understanding and act as well-informed as any other stakeholders. Students do have the ability to judge the appropriateness, fairness and feasibility of the tasks that are required in an assessment. Their views should be taken as seriously as any other stakeholder. Secondly, the study concluded that students aren't always looking for the easy way out. Students in the study questioned what some forms of assessment forced them to do. Students interviewed in the study found alternative assessment to be stimulating and challenging indicating that "the tasks were meaningful and would allow genuine learning to be assessed" (McDowell and Sambell, 1999). Finally, the study concluded that students are able to act as objective decision-makers in the assessment process as they desire 'good' assessments that measure their abilities fairly. Of the many stakeholders in the assessment process students need to be included (McDowell & Sambell, 1999).

Authentic assessment methods are necessary in the educational process. It is authentic assessment methods that strive toward fair testing methods. Assessments are a key component in the learning process and should be designed to appropriately assess student learning. Research indicates that standard testing measures are not the best way to

assess student learning. There is a need for application-based assessments to show skill competency. Research also shows that students need to be included in the assessment process as they care about the methods that are used to assess their learning. Although there are some experts that don't see authentic assessment methods as the answer to appropriate assessment procedures, research also indicates authentic assessment is the key to creating fair tests that positively affect student learning. Research has shown that paper and pencil tests are not the best way and can in many cases be the easy way to handle assessment. Assessments that address real-world applications are necessary to prepare adults for future employment.

Chapter III: Methodology

Authentic or performance-based assessment methods are designed to show a student's ability to apply what they've learned in the classroom. In order to analyze the effectiveness of authentic assessment methods, the use of authentic assessment in an Information Technology course at Waukesha County Technical College (WCTC) was evaluated. This chapter details the selection and description of the sample, the instrument development that was used to evaluate authentic assessment methods, the data collection process and data analysis methods that were used as well as the limitations of the study.

Selection and Description of Sample

The effectiveness of authentic assessment methods in the Computer Networking program at WCTC was of specific interest. The sample chosen includes three sections of the Introduction to Networking course during the spring semester of 2007. Due to the variations in delivering course material and evaluating the assessments, the sample includes only those sections of the Introduction to Networking course that were taught by the original developer of the curriculum rather than sampling all four sections of the Introduction to Networking course that were offered at WCTC during that term. It is also realistic to include all students enrolled in the course by gathering the data during class time. Therefore rather than a random sample, this study employed a cluster sample. Students were clustered in the three sections of Introduction to Networking.

As a post-secondary institution, WCTC attracts a varied population of students. This is also true of the students enrolled in the Introduction to Networking course. Past records from the Introduction to Networking Course show a majority of male students as well as a high number of students in the 18-20 age range. Also, a majority of students

taking Introduction to Networking have no prior post-secondary education. This is a good indication of the population sample used in the study.

Instrumentation

A study of this nature has never been conducted at WCTC and in order to fit the research questions of the study, the instrument that was used to analyze the effectiveness of authentic assessment in the Introduction to Networking course was a survey developed by the researcher. The questions chosen for the survey are valid for the study because they map directly to the research objectives stated in Chapter 1. The survey instrument went through a peer evaluation process during the Research Foundations course in the fall semester of 2006. Feedback was given and adjustments were made to the survey tool to reflect recommendations of question clarity made by peers. The instrument was also evaluated by two experts in the research field, Kay Lehmann, professor of the Research Foundations course at the University of Wisconsin Stout and Dr. Howard Lee, Program Director of the Career and Technical Education Graduate program and research advisor at the University of Wisconsin Stout. Recommendations were made by both experts to create clarity in the questions and adjustments were made based on their recommendations. Results are reliable because the questions are stated clearly and are designed to yield consistent results. However, because this instrument was created specifically for this study, no measures of validity or reliability have been documented. Due to the peer and expert evaluation process, there was no need for a pilot.

The survey was created using the online survey tool provided by the University of Wisconsin Stout (University of Wisconsin Stout Board of Regents, 2006). Copies of the surveys can be found in Appendix A and B. One of the goals of the study was to compare

the effectiveness of authentic assessment by various demographic factors. In order to address this goal, the survey began by asking questions about gender, age, and education as a way to collect the data necessary to make this comparison. Another goal of the study was to determine the positive and negative perceptions of authentic assessment. A portion of the instrument contained statements relating to overall perceptions of the assessment methods used in the class. The students were asked to use a five-point Likert scale to respond to statements about each perception with an answer of strongly agree, agree, neutral, disagree, or strongly disagree. In addition to the statements using the Likert scale, another component of the instrument asked open-ended questions about the positive and negative perceptions of the assessments used in the course. Another goal of the study was to look at the advantages of authentic assessment in measuring competency; therefore a section of the instrument included statements about each course competency and whether the assessments used in the course were effective in measuring competency. The students were also asked to use a five-point Likert scale to respond to statements with an answer of strongly agree, agree, neutral, disagree, or strongly disagree. Finally, in order to address the perceptions of authentic assessment in the beginning of the course and compare the perceptions at the end of the course, two survey instruments were created. Each survey asked the same questions using different verb tenses to address the future vs. the past experiences of the students. All research materials were approved by the Instructional Review Board at the University of Wisconsin Stout prior to data collection.

Data Collection

The surveys were administered at the beginning and again at the end of the spring 2007 semester in three sections of the Introduction to Networking course at Waukesha

County Technical College. These three sections were taught by the original curriculum developer and were chosen in order to create consistency in the data collected. The Introduction to Networking course is a two-credit course that meets in a three-hour time block once per week for 16 weeks. The timeline of the course indicates that the assessment methods will be introduced during the first class period of the course; therefore the first survey was administered at the beginning of the second-class period in order to allow students to be introduced to the assessment process. Additionally, all assessments are completed by the students prior to the fifteenth class period with only one of the assessments pending evaluation by the instructor; therefore students have appropriate exposure to the assessment process in order to answer the questions on the post-course survey effectively. Therefore, the post-course survey was administered during the fifteenth week of the course.

The pre-course survey was administered during the week of January 22, 2008. The first section of Introduction to Networking meets weekly on Tuesdays from 9:30am to 12:25pm. This class was surveyed at the beginning of the class period on January 23rd, 2007. The other two sections of the Introduction to Networking course meet on Wednesdays from 9:00am to 11:55am and 12:30pm to 3:25pm. They were surveyed on January 24th, 2007; also at the beginning of the class period. The post-course survey was administered during the week of April 30th, 2007. The first section of Introduction to Networking was surveyed at the beginning of the class period on May 1st, 2007. The other two sections were surveyed on May 2nd, 2007; also at the beginning of the class period. Students were given an overview of the study as documented in the Implied Consent Form (found in Appendix C). Students were also shown how to use the online

survey tool. All students were informed that the survey is confidential, anonymous and voluntary and that although the survey would take approximately ten minutes, they could take as long as they needed to complete the survey. Students were also informed of the risks as well as the benefits of participating in the study as indicated in the Implied Consent Form. A link to the survey tool was presented via an announcement in BlackBoard, the Course Management Software used at Waukesha County Technical College. The students were given an appropriate amount of time to complete the survey. No one took more than fifteen minutes.

Data Analysis

Data collected from the two surveys was separated into the demographic categories of gender, age, and education level in order to make conclusions about the perception of authentic assessment in these categories. Survey results were also used to determine the advantages of authentic assessment by a quantitative analysis of the responses to the statements made about assessment and determining the number of those that strongly agree, agree, neutral, disagree or strongly disagree. Finally, a qualitative analysis was used to determine the positive and negative perceptions of authentic assessment based on answers to the open-ended questions of the survey.

Limitations

The study attempts to ensure the highest levels of validity and reliability, however there were some limitations. One of these limitations included the survey instrument. Because it was developed specifically for this study, it has not undergone testing of validity and reliability. The second limitation is the small sampling of the population of students. The study results come from only three courses in the computer networking area

at WCTC that is offered during the spring 2007 semester. A third limitation the study sample itself that includes only those students enrolled in the courses taught by the course curriculum developer rather than the entire enrollment in the Introduction to Networking course. An additional limitation exists due to the fact that the study was not able to take into account those students that dropped out of the course after the second class period. Finally, the study will base its results on student surveys given twice during the semester and does not consider those absent on the day the survey was administered.

Chapter IV: Analysis of Results

Introduction

The purpose of this study was to evaluate the effectiveness of authentic assessment methods used in the Introduction to Networking course at WCTC. A survey was administered to three sections of the Introduction to Networking course during the spring semester of 2007 in order to gather data from students regarding the effectiveness of the assessment methods used in the course. Two surveys were administered; one at the beginning of the course during class time of the second class period (pre-class survey) and a second during class time of the second-to-last class period (post-class survey). The surveys were identical except in respect to the verb tense used to reflect future vs. past tense. This chapter will detail the findings of the survey data.

Demographics

The demographic breakdown of the two surveys were similar however, there was a significant reduction in the number of students completing the post-survey due to students dropping the class during the course of the semester. There were 37 respondents in the pre-class survey and only 23 in the post-class survey. Table 1 shows a breakdown of students by section based on enrollment statistics at the beginning of the semester and at the end of the semester as well as showing the number of students that dropped the course. Enrollment statistics differ from survey data due to those absent on the days of the survey administration as well as the voluntary nature of the survey. Overall, 12 (26.7%) students dropped out.

Table 1

Breakdown of Students by Section

Section		Pre-Class	Post-Class	Drop-outs
1	N	14	11	3
	%	31.1%	33.3%	21.4%
2	N	12	10	2
	%	26.7%	30.3%	16.7%
3	N	19	12	7
	%	42.2%	36.3%	36.8%
Final Total	N	45	33	12
	%	100.0%	73.3%	26.7%

Overall, demographic data collected from the surveys administered in the Introduction to Networking course show a large number of male respondents in the 18-20 yr. age group with high-school diplomas. A large majority of respondents in each survey was male. In the pre-class survey, 32 (86.5%) of respondents were male and in the post-class survey, 18 (78.3%) of the respondents were male. A breakdown of gender in each survey is shown in Table 2. Enrollment statistics show that all students that dropped the course were male. Students at WCTC drop on their own for various reasons and others get dropped by the instructor due to lack of attendance in the course. Because the survey data was collected anonymously, there is no way to determine matched pairs from the pre-class survey to the post-class survey.

Table 2

Breakdown of Pre and Post-Class Survey by Gender

Survey		Males	Females	Total
Pre-class	N	32	5	37
	%	86.5%	13.5%	100.0%
Post-class	N	18	5	23
	%	78.3%	21.7%	100.0%
Total	N	50	10	60
	%	83.5%	16.7%	100.0%

The majority of respondents from each survey were in the 18-20 yr age group indicating a large number of recent high school graduates. Table 3 shows the breakdown of respondents by age group. Of the 37 respondents from the pre-class survey, 21 (56.8%) were between 18 and 20 yrs of age. Of the 23 respondents from the post-class survey, 10 (45.5%) were between 18 and 20 yrs of age. The number of respondents from the 21-25 yr age group was also significant with 6 (16.2%) from the pre-class survey and 4 (17.4%) from the post-class survey. A continued breakdown of respondents in the 26-30 age group shows only 2 (5.4%) from the pre-class survey and 1 (4.3%) from the post-class survey. There were also a small number of respondents in the 31-40 age group with 5 (13.5%) from the pre-class survey and 4 (17.4%) from the post class survey. Only one respondent (2.7%) from the pre-class survey and 3 (13.0%) from the post class survey were in the 41-50 age group and 2 (5.4%) from the pre-class survey and 1 (4.3%) from the post-class survey in the 51-60 age group.

Table 3

Breakdown of Pre and Post-Class Survey by Age Group

Age Group		Pre-class survey	Post-class Survey	Total
15-17	N	0	0	0
	%	0.0%	0.0%	0.0%
18-20	N	21	10	31
	%	56.8%	43.5%	51.7%
21-25	N	6	4	10
	%	16.2%	17.4%	16.7%
26-30	N	2	1	3
	%	5.4%	4.3%	5.0%
31-40	N	5	4	9
	%	13.5%	17.4%	15.0%
41-50	N	1	3	4
	%	2.7%	13.0%	6.7%
51-60	N	2	1	3
	%	5.4%	4.3%	5.0%
Total	N	37	23	60
	%	100.0%	100.0%	100.0%

Education levels as shown in the survey data show a majority of respondents with high school diplomas and only a small number of respondents with higher education. Table 4 shows the breakdown of education level in each survey. In the pre-class survey, 33 (89.2%) had a high school diploma or GED. In the post-class survey, 17 (73.9%) had a high school diploma. There were 2 (5.4%) respondents in the pre-class survey with 2-yr. Associate Degree's and 3 (13.0%) in the post-class survey with 2-yr. Associate degrees. There was only 1 (2.7%) in the pre-class survey and 1 (4.3%) in the post-class survey with 4-yr. Bachelor's Degrees. None of the respondents in either survey held Master's Degrees and 1 (2.7%) in the pre-class survey and 2 (8.7%) in the post class survey with

Doctoral Degrees. The difference in pre and post-class data of Master's Degree's and Doctoral Degrees can be attributed to respondents giving false responses in the post-class survey as enrollment statistics indicate that there were only students that dropped the course; none were added after the second class period.

Table 4

Breakdown of Pre and Post-Class Surveys by Education Level

Education Level Attained		Pre-class survey	Post-class Survey
Less than high school	N	0	0
	%	0.0%	0.0%
High School/GED	N	33	17
	%	89.2%	73.9%
2-yr Associate Degree	N	2	3
	%	5.4%	13.0%
4-yr Bachelor's Degree	N	1	1
	%	2.7%	4.3%
Master's Degree	N	0	0
	%	0.0%	0.0%
Doctoral Degree	N	1	2
	%	2.7%	8.7%

Advantages of Authentic Assessment in Measuring Competency

Both surveys contained statements about each competency in the Introduction to Networking course and whether the respondent perceive that the assessments used in the course addressed each competency. Students were asked to respond to each statement using a 5-point Likert scale with answers of strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1). In order to show the connection between competency and the assessment process, Table 5 shows the mean values for each competency broken down by pre and post-class survey results. Overall perception of competency in both surveys was high with mean values of ≥ 4 for each competency with the competency "Work in a team setting to complete a collaborative project" scoring a

3.87 on a five point scale in the post-class survey. Standard deviation ranged from a low of .511 to .869 indicating there was very little variability among respondents.

Table 5

Perception of Competency Based on Mean Values in Pre and Post-Class Surveys

Competency		Mean	Std. Deviation
Identify network topologies used today and design a network using these topologies	Pre	4.43	.603
	Post	4.30	.635
Assess when to apply the appropriate networking hardware	Pre	4.30	.661
	Post	4.52	.511
Identify and define network protocols	Pre	4.35	.538
	Post	4.57	.507
Assess when to apply the appropriate network architectures	Pre	4.30	.571
	Post	4.50	.512
Identify the daily tasks involved with managing and troubleshooting a network	Pre	4.35	.588
	Post	4.30	.765
Reflect on the use of networking in a business or home user setting	Pre	4.47	.609
	Post	4.48	.511
Work in a team setting to complete a collaborative project	Pre	4.25	.604
	Post	3.87	.869

Specific responses to the competency statements seem to indicate a strong agreement with the ability for the assessment process to show competency in the course. In response to the competency “Identify network topologies used today and design a network based on these topologies”, 18 (48.6%) of respondents in the pre-class survey and 9 (39.1%) in the post-class survey answered ‘strongly agree’, 17 (45.9%) in the pre-class survey and 12 (52.2%) in the post-class survey ‘agree’, 2 (5.4%) in the pre-class

survey and 2 (8.7%) in the post-class survey remained neutral and none of the respondents disagreed with the statement. In response to the competency, “Assess when to apply the appropriate networking hardware”, 15 (40.5%) in the pre-class survey and 12 (52.2%) in the post class survey ‘strongly agree’, 18 (48.6%) in the pre-class survey and 11 (47.8%) in the post-class survey ‘agree’, 4 (10.8%) in the pre-class survey and 0 (0.0%) in the post-class survey remain neutral and none of the respondents disagreed with the statement. In response to the competency, “Identify and define network protocols”, 14 (37.8%) in the pre-class survey and 13 (56.5%) in the post-class survey ‘strongly agree’, 22 (59.5%) in the pre-class survey and 10 (43.5%) in the post class survey ‘agree’, 1 (2.7%) in the pre-class survey and 0 (0.0%) in the post-class survey remained neutral, none of the respondents disagreed with the statement. In response to the competency, “Assess when to apply the appropriate network architectures”, 13 (35.1%) in the pre-class survey and 11 (50.0%) in the post-class survey ‘strongly agree’, 22 (59.5%) in the pre-class survey and 11 (50.0%) in the post-class survey ‘agree’, 2 (5.4%) in the pre-class survey and 0 (0.0%) in the post-class survey remained neutral, none of the respondents disagreed with the statement and 1 respondent in the post-class survey did not respond. In response to the competency, “Identify the daily tasks involved with managing and troubleshooting a network”, 15 (40.5%) in the pre-class survey and 10 (43.5%) in the post-class survey ‘strongly agree’, 20 (54.1%) in the pre-class survey and 11 (47.8%) in the post-class survey ‘agree’, 2 (5.4%) in the pre-class survey and 1 (4.3%) in the post-class survey remained neutral, 0 (0.0%) in the pre-class survey and 1 (4.3%) in the post-class survey ‘disagree’, none of the respondents strongly disagreed. In response to the competency, “Reflect on the use of networking in a business or home user setting”, 19

(52.8%) in the pre-class survey and 11 (47.8%) in the post class survey 'strongly agree', 15 (41.7%) in the pre-class survey and 12 (52.2%) in the post-class survey 'agree', 2 (5.6%) in the pre-class survey and 0 (0.0%) remained neutral, none of the respondents disagreed with the statement. In response to the competency, "Work in a team setting to complete a collaborative project", 12 (33.3%) in the pre-class survey and 6 (26.1%) in the post-class survey 'strongly agree', 21 (58.3%) in the pre-class survey and 9 (39.1%) in the post-class survey 'agree', 3 (8.3%) in the pre-class survey and 7 (30.4%) in the post-class survey remained neutral, 0 (0.0%) in the pre-class survey and 1 (4.3%) in the post-class survey 'disagree', and none of the respondents strongly disagreed with the statement. This analysis of data tends to show that students feel the assessment process is closely linked to competencies in the course and that authentic assessment is a beneficial way to assess competency. Table 6 shows a breakdown of the responses to the competency statements.

Table 6: Responses to Competency Statements

Competency			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	N/A
Identify network topologies used today and design a network using these topologies	Pre	N %	0 0.0%	0 0.0%	2 5.4%	17 45.9%	18 48.6%	0 0.0%
	Post	N %	0 0.0%	0 0.0%	2 8.7%	12 52.2%	9 39.1%	0 0.0%
Assess when to apply the appropriate networking hardware	Pre	N %	0 0.0%	0 0.0%	4 10.8%	18 48.6%	15 40.5%	0
	Post	N %	0 0.0%	0 0.0%	0 0.0%	11 47.8%	12 52.2%	0
Identify and define network protocols	Pre	N %	0 0.0%	0 0.0%	1 2.7%	22 59.5%	14 37.8%	0
	Post	N %	0 0.0%	0 0.0%	0 0.0%	10 43.5%	13 56.5%	0
Assess when to apply the appropriate network architectures	Pre	N %	0 0.0%	0 0.0%	2 5.4%	22 59.5%	13 35.1%	0
	Post	N %	0 0.0%	0 0.0%	0 0.0%	11 50.0%	11 50.0%	1
Identify the daily tasks involved with managing and troubleshooting a network	Pre	N %	0 0.0%	0 0.0%	2 5.4%	20 54.1%	15 40.5%	0
	Post	N %	0 0.0%	1 4.3%	1 4.3%	11 47.8%	10 43.5%	0
Reflect on the use of networking in a business or home user setting	Pre	N %	0 0.0%	0 0.0%	2 5.6%	15 41.7%	19 52.8%	1
	Post	N %	0 0.0%	0 0.0%	0 0.0%	12 52.2%	11 47.8%	0
Work in a team setting to complete a collaborative project	Pre	N %	0 0.0%	0 0.0%	3 8.3%	21 58.3%	12 33.3%	1
	Post	N %	0 0.0%	1 4.3%	7 30.4%	9 39.1%	6 26.1%	0

Differences in the Perception of Authentic Assessment by Students Based on Selected Demographic Factors

Results from the post-class surveys were used to show the differences in perception of authentic assessment in relation to the demographic factors of gender, age, and education level. Post-class survey results were chosen because students had full exposure to the assessment process. A combination of independent groups t-tests along with Levene's test for equality of variances to determine the equality of means were used to determine significant difference in gender and education level. A one-way analysis of variance (ANOVA), with a student Newman-Keuls and Duncan's multiple range tests was used to determine significant differences for the age groups.

The first test identifies gender as the independent variable in order to show the significance of gender in perceptions of authentic assessment. There were 18 male respondents and 5 female respondents in the post-class survey. An independent groups t-test was performed on the 5-point Likert scale answers given by students. Mean values of male and female respondents from each of the statements were very close and score ≥ 4 on a 5-point scale. One exception was the mean values for the statement, "Invest more time completing assessments vs. paper and pencil tests" in which male respondents scored a mean value of 3.83. Also, the results of the t-test for equality of means in Table 7 show the significant differences in perception of authentic assessment using Levene's test for equality of variances to determine whether the males and females have approximately equal variance on each statement of authentic assessment. The values of

the 2-tailed significance for each statement are all ≥ 0.05 ; with exception to the statement, “Invest more time completing assessments vs. paper and pencil tests”. Female respondents scored much higher in their responses to this statement with a mean value of 4.60 vs. the male respondents mean value of 3.83; a significant difference of 0.77.

Table 7

Perception Analysis by Gender in Post-Class Survey

Perception statement	Gender	Mean	Std. Deviation	t	df	Sig. (2-tailed)																																																																																																
Understand the assessments used in the course	Male	4.67	.686	.199	21	.844																																																																																																
	Female	4.60	.548				Motivated to complete the assessments	Male	4.44	.922	.102	21	.920	Female	4.40	.548	Will be able to retain what I have learned	Male	4.50	.618	.327	21	.747	Female	4.40	.548	Will be able to apply what I have learned outside of class	Male	4.67	.485	-.309	20	.760	Female	4.75	.500	Assessment process is a fair measurement of my abilities	Male	4.61	.698	.033	21	.974	Female	4.60	.548	Will enjoy working on the classroom assessments	Male	4.33	.686	-.199	21	.844	Female	4.40	.548	There are a variety of assessments	Male	4.61	.502	.345	21	.746	Female	4.40	1.342	Assessments will appropriately measure what I am learning	Male	4.50	.707	-.291	21	.774	Female	4.60	.548	Scoring rubrics are easy to understand	Male	4.78	.428	.641	21	.528	Female	4.60	.894	Will be able to complete the final project based on case projects	Male	4.29	1.047	-.621	20	.541	Female	4.60	.548	Invest more time vs. paper and pencil tests	Male	3.83	.857	-1.878	21
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Age was the next demographic factor that was analyzed. The age groups were split into three categories of 18-20 yrs, 21-30 yrs and 31 or older. Results of the post-class survey were again used to determine significant differences in perceptions of authentic assessment in these age groups. There were 10 respondents in the 18-20 yr age group, 5 respondents in the 21-30 yr age group, and 8 respondents in the 31 or older age group. Table 8 shows the mean values of the perception statements for each age group. Mean values are consistently ≥ 4 with a few exceptions. The perception statement, "Will be able to complete the final project base on case projects" scored a mean value ≥ 4 for all age groups except the 31 or older age group with a mean value of 3.88. Additionally, the perception statement, "Invest more time completing the assessments vs. paper and pencil tests" score ≥ 4 with the exception of the 31 and older age group with a mean value of 3.75.

Table 8

Perception Analysis by Age Group in Post-class Survey

Perception statement	Age group	Mean	Std. Deviation
Understand the assessments used in the course	18-20	4.80	.422
	21-30	4.80	.447
	31 or older	4.38	.916
	Total	4.65	.647
Motivated to complete the assessments	18-20	4.30	1.059
	21-30	4.20	.837
	31 or older	4.75	.463
	Total	4.43	.843
Will be able to retain what I have learned	18-20	4.40	.699
	21-30	4.60	.548
	31 or older	4.50	.535
	Total	4.48	.593
Will be able to apply what I have learned outside of class	18-20	4.80	.422
	21-30	4.80	.447
	31 or older	4.43	.535
	Total	4.68	.477
Assessment process is a fair measurement of my abilities	18-20	4.70	.483
	21-30	4.80	.447
	31 or older	4.38	.916
	Total	4.61	.656
Will enjoy working on the classroom assessments	18-20	4.30	.675
	21-30	4.20	.447
	31 or older	4.50	.756
	Total	4.35	.647
There are a variety of assessments	18-20	4.50	.527
	21-30	4.20	1.304
	31 or older	4.88	.354
	Total	4.57	.728
Assessments will appropriately measure what I am learning	18-20	4.40	.699
	21-30	4.60	.548
	31 or older	4.63	.744
	Total	4.52	.665
Scoring rubrics are easy to understand	18-20	4.70	.483
	21-30	4.60	.894
	31 or older	4.88	.354
	Total	4.74	.541
Will be able to complete the final project based on case projects	18-20	4.56	.726
	21-30	4.80	.447
	31 or older	3.88	1.246
	Total	4.36	.953

Perception statement	Age group	Mean	Std. Deviation
Invest more time vs. paper and pencil tests	18-20	4.10	.876
	21-30	4.20	.837
	31 or older	3.75	.886
	Total	4.00	.853

In order to further determine if there is a significant difference in the perceptions of authentic assessment between age groups and within age groups for each perception statement, a one-way analysis of variance (ANOVA) with a student Newman-Keuls and Duncan's Multiple Range Test was performed using the 3 age groups as the independent variables. The ANOVA data in Table 9 displays an insignificant difference between the age of the student and their perception of authentic assessment for all perception statements; therefore, age seems to be an insignificant factor in determining perception of authentic assessment in the Introduction to Networking course at WCTC.

Table 9

ANOVA of Perception Statements Based on Differences Between and Within Age

Groups in Post-Class Survey

Perception Statement		Sum of Squares	df	Mean Square	F	Sig. (2-tailed)
Understand the assessments used in the course	Between groups	.942	2	.471	1.139	.340
	Within Groups	8.275	20	.414		
	Total	9.217	22			
Motivated to complete the assessments	Between groups	1.252	2	.626	.870	.434
	Within Groups	14.400	20	.720		
	Total	15.652	22			
Will be able to retain what I have learned	Between groups	.139	2	.070	.183	.834
	Within Groups	7.600	20	.380		
	Total	7.739	22			
Will be able to apply what I have learned outside of class	Between groups	.658	2	.329	1.520	.244
	Within Groups	4.114	19	.217		
	Total	4.773	21			
Assessment process is a fair measurement of my abilities	Between groups	.703	2	.352	.801	.463
	Within Groups	8.775	20	.439		
	Total	9.478	22			
Will enjoy working on the classroom assessments	Between groups	.317	2	.159	.357	.704
	Within Groups	8.900	20	.445		
	Total	9.217	22			
There are a variety of assessments	Between groups	1.477	2	.739	1.452	.258
	Within Groups	10.175	20	.509		
	Total	11.652	22			
Assessments will appropriately measure what I am learning	Between groups	.264	2	.132	.279	.760
	Within Groups	9.475	20	.474		
	Total	9.739	22			
Scoring rubrics are easy to understand	Between groups	.260	2	.130	.421	.662
	Within Groups	6.175	20	.309		
	Total	6.435	22			
Will be able to complete the final project based on case projects	Between groups	3.194	2	1.597	1.909	.176
	Within Groups	15.897	19	.837		
	Total	19.091	21			
Invest more time vs. paper and pencil tests	Between groups	.800	2	.400	.526	.599
	Within Groups	15.200	20	.760		
	Total	16.000	22			

Level of education was the final demographic factor to be analyzed in order to determine if there was a significant difference in perception of authentic assessment in those with high school diplomas/GED and those with post-secondary degrees. An independent groups t-test for equality of means was performed on each perception statement using education level as the independent variable. There were 17 respondents with a high school diploma/GED and 6 respondents with post secondary degrees. The majority of perceptions showed no significant difference in relation to age with a few exceptions. The perception statement, "Will enjoy working on the classroom assessment" shows a significant difference in mean values with post-secondary respondents scoring 4.83 and high school/GED respondents scoring a mean value of 4.18; a 0.65 difference or $p = .029$. Another significant perception difference was with the perception statement, "There are a variety of assessments". Post secondary respondents show a mean value of 5.00 vs. the high school/GED respondents mean score of 4.41; a difference of 0.51 with a $p = .008$. The final significant difference in perception based on education level was "Scoring rubrics are easy to understand". Post secondary respondents show a mean value of 5.00 vs. the high school/GED respondents with a mean value of 4.65; a difference of 0.65 with a $p = .029$. Table 10 shows the results of the t-test.

Table 10

Perception Analysis by Education Level in Post-Class Survey

Perception statement	Education Level	Mean	Std. Deviation	t	df	Sig. (2-tailed)																																																																																																
Understand the assessments used in the course	HS/GED	4.59	.712	-.791	21	.438																																																																																																
	Post-sec.	4.83	.408				Motivated to complete the assessments	HS/GED	4.35	.931	-.776	21	.446	Post-sec.	4.67	.516	Will be able to retain what I have learned	HS/GED	4.41	.618	-.901	21	.378	Post-sec.	4.67	.516	Will be able to apply what I have learned outside of class	HS/GED	4.71	.470	.428	20	.673	Post-sec.	4.60	.548	Assessment process is a fair measurement of my abilities	HS/GED	4.53	.717	-1.261	21	.225	Post-sec.	4.83	.408	Will enjoy working on the classroom assessments	HS/GED	4.18	.636	-2.346	21	.029	Post-sec.	4.83	.408	There are a variety of assessments	HS/GED	4.41	.795	-3.050	16.000	.008	Post-sec.	5.00	.000	Assessments will appropriately measure what I am learning	HS/GED	4.47	.717	-.612	21	.547	Post-sec.	4.67	.516	Scoring rubrics are easy to understand	HS/GED	4.65	.606	-2.400	16.000	.029	Post-sec.	5.00	.000	Will be able to complete the final project based on case projects	HS/GED	4.31	1.078	-.403	20	.692	Post-sec.	4.50	.548	Invest more time vs. paper and pencil tests	HS/GED	4.00	.866	.000	21
Motivated to complete the assessments	HS/GED	4.35	.931	-.776	21	.446																																																																																																
	Post-sec.	4.67	.516				Will be able to retain what I have learned	HS/GED	4.41	.618	-.901	21	.378	Post-sec.	4.67	.516	Will be able to apply what I have learned outside of class	HS/GED	4.71	.470	.428	20	.673	Post-sec.	4.60	.548	Assessment process is a fair measurement of my abilities	HS/GED	4.53	.717	-1.261	21	.225	Post-sec.	4.83	.408	Will enjoy working on the classroom assessments	HS/GED	4.18	.636	-2.346	21	.029	Post-sec.	4.83	.408	There are a variety of assessments	HS/GED	4.41	.795	-3.050	16.000	.008	Post-sec.	5.00	.000	Assessments will appropriately measure what I am learning	HS/GED	4.47	.717	-.612	21	.547	Post-sec.	4.67	.516	Scoring rubrics are easy to understand	HS/GED	4.65	.606	-2.400	16.000	.029	Post-sec.	5.00	.000	Will be able to complete the final project based on case projects	HS/GED	4.31	1.078	-.403	20	.692	Post-sec.	4.50	.548	Invest more time vs. paper and pencil tests	HS/GED	4.00	.866	.000	21	1.000	Post-sec.	4.00	.894						
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Positive and negative perceptions of authentic assessment by students in the Introduction to Networking course at WCTC

Survey results were again used to determine the positive and negative perceptions of authentic assessment. This analysis used both quantitative and qualitative data.

Quantitative data came from perception statements in the post-class survey using mean values from the 5-point Likert scale answers. Mean scores for each perception indicate a high rate of positive responses with mean scores consistently above 4. One exception was the perception statement, "Will enjoy working on the classroom assessments" in the pre-class survey with a mean value of 3.68. The high mean values all above 3 indicate that perceptions of authentic assessment methods are positive and there are no negative perceptions of the statements in the survey. Table 11 shows the mean values for each perception statement.

Table 11

Positive and Negative Perceptions of Authentic Assessment

Perception		Mean	Std. Deviation
Understand the assessments used in the course	Pre	4.49	.607
	Post	4.65	.647
Motivated to complete the assessments	Pre	4.35	.676
	Post	4.43	.843
Will be able to retain what I have learned	Pre	4.24	.683
	Post	4.48	.593
Will be able to apply what I have learned outside of class	Pre	4.57	.555
	Post	4.68	.477
Assessment process is a fair measurement of my abilities	Pre	4.22	.750
	Post	4.61	.656
Will enjoy working on the classroom assessments	Pre	3.68	.852
	Post	4.35	.647
There are a variety of assessments	Pre	4.08	.682
	Post	4.57	.728
Assessments will appropriately measure what I am learning	Pre	4.22	.672
	Post	4.52	.665
Scoring rubrics are easy to understand	Pre	4.42	.732
	Post	4.74	.541
Will be able to complete the final project based on case projects	Pre	4.30	.661
	Post	4.36	.953
Invest more time vs. paper and pencil tests	Pre	4.00	.667
	Post	4.00	.853

Qualitative data taken from survey questions in both the pre-class and post-class survey shed some additional light on positive and negative perceptions. Two open-ended questions at the end of each survey asked, “What do/did you like about the course

assessments?” and “What do/did you not like about the course assessments?” Positive responses from respondents in the pre-class survey to “What do you like about the course assessments?” include, “Hands-on, learn and do real-world stuff”, “Helps to maintain focus and learn the information needed in the course”, “I like that the answers are not going to be given to me by way of multiple choice questions rather than actually thinking about the problem and coming up with the correct answer”, “I like that they are more hands on and not so paper and pencil like”, “I learn better from hands-on training and teaching so I feel this will benefit me greatly and make things easier to understand”, “I will be able to apply what I have learned into my daily life”, “it’s a change of pace from your standard tests, papers, and other mundane class activities”, “no busy-work”, “real world problems vastly differ from text book situations”, and “they are a more practical way of assessing my level of learning than a multiple guess test”. Positive responses from the post-class survey include, “different, not like every class”, “even though the case projects were very time consuming, they were necessary to excel in this networking program”, “the in-class presentations were a good way to learn, for both the speakers and the audience”, “I liked how there was a variety in the assessments, and I like the time allotted for each”, the assessments were geared towards active learning rather than book learning. By incorporating multimedia and other learning techniques we as a class were able to retain more information than in the standard paper and pencil tests”, “there was a variety—both as to mode and type”, “the assessments were foundational in that they helped you learn the material from a ground-up format”, and “the assessments were also consistent, which is helpful to me”.

Negative perceptions were taken from the open-ended questions at the end of each survey. Respondents' answers to the pre-class survey question, "What do you dislike about the assessments?" include: "a little too much social participation is required", "presentations are dumb", "sometimes the length of the assessments can be lengthy", "the case projects. There should be more hands on work and labs to really test what the student has learned by actually applying it", and "the time needed to do them that takes away from other stuff I want to do". Respondents' answers to the post-class survey question, "What did you dislike about the assessments?" include: "graded based on opinion", "I thought the case projects became too routine. They could also be time-consuming", "not enough hands-on", "the staggering amount of time it took to complete some of them", "they caused me a lot of skull sweat", and "they could have been easier".

Difference in perceptions about authentic assessment by students prior to and upon completing the Introduction to Networking course at WCTC

Based on results from the pre-class survey and the post-class survey, an independent groups t-test was performed on the perception statements using pre-class and post-class as the independent variables. Significant changes in student perception of authentic assessment as identified by 2-tailed significance values ≤ 0.05 in the t-test results are, “Assessment process is a fair measurement of my abilities.” Mean values rose from 4.22 to 4.61; an increase of 0.37. The perception, “Will enjoy working on classroom assessments” scoring a mean value of 3.68. This perception changed upon completion of the course with a mean score of 4.35; a very significant increase of 0.67. Student perceptions of “Variety of assessment methods” changed from 4.08 to 4.57; a 0.49 increase in score. “Assessments will appropriately measure what I am learning” and “Scoring rubrics are easy to understand” also show significant changes. “Assessments will appropriately measure what I am learning” is close to the ≤ 0.05 2-tailed significance value. Mean scores rose from 4.22 to 4.52; an increase of 0.30. Mean scores of the statement, “Scoring rubrics are easy to understand” rose from 4.42 to 4.74; an increase of 0.32. Mean values and t-test results are shown in Table 12.

Table 12

Perceptions of Authentic Assessment Prior to and Upon Completion of the Introduction to Networking Course

Perception statement	Time when survey was administered	Mean	Std. Deviation	t	df	Sig. (2-tailed)																																																																																																
Understand the assessments used in the course	Pre-class	4.49	.607	-1.003	58	.320																																																																																																
	Post-class	4.65	.647				Motivated to complete the assessments	Pre-class	4.35	.676	-.422	58	.674	Post-class	4.43	.843	Will be able to retain what I have learned	Pre-class	4.24	.683	-1.360	58	.179	Post-class	4.48	.593	Will be able to apply what I have learned outside of class	Pre-class	4.57	.555	-.805	57	.424	Post-class	4.68	.477	Assessment process is a fair measurement of my abilities	Pre-class	4.22	.750	-2.064	58	.044	Post-class	4.61	.656	Will enjoy working on the classroom assessments	Pre-class	3.68	.852	-3.244	58	.002	Post-class	4.35	.647	There are a variety of assessments	Pre-class	4.08	.682	-2.605	58	.012	Post-class	4.57	.728	Assessments will appropriately measure what I am learning	Pre-class	4.22	.672	-1.718	58	.091	Post-class	4.52	.665	Scoring rubrics are easy to understand	Pre-class	4.42	.732	-1.941	55.684	.057	Post-class	4.74	.541	Will be able to complete the final project based on case projects	Pre-class	4.30	.661	-.315	57	.754	Post-class	4.36	.953	Invest more time vs. paper and pencil tests	Pre-class	4.00	.667	.000	38.495
Motivated to complete the assessments	Pre-class	4.35	.676	-.422	58	.674																																																																																																
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There are a variety of assessments	Pre-class	4.08	.682	-2.605	58	.012																																																																																																
	Post-class	4.57	.728				Assessments will appropriately measure what I am learning	Pre-class	4.22	.672	-1.718	58	.091	Post-class	4.52	.665	Scoring rubrics are easy to understand	Pre-class	4.42	.732	-1.941	55.684	.057	Post-class	4.74	.541	Will be able to complete the final project based on case projects	Pre-class	4.30	.661	-.315	57	.754	Post-class	4.36	.953	Invest more time vs. paper and pencil tests	Pre-class	4.00	.667	.000	38.495	1.000	Post-class	4.00	.853																																																								
Assessments will appropriately measure what I am learning	Pre-class	4.22	.672	-1.718	58	.091																																																																																																
	Post-class	4.52	.665				Scoring rubrics are easy to understand	Pre-class	4.42	.732	-1.941	55.684	.057	Post-class	4.74	.541	Will be able to complete the final project based on case projects	Pre-class	4.30	.661	-.315	57	.754	Post-class	4.36	.953	Invest more time vs. paper and pencil tests	Pre-class	4.00	.667	.000	38.495	1.000	Post-class	4.00	.853																																																																		
Scoring rubrics are easy to understand	Pre-class	4.42	.732	-1.941	55.684	.057																																																																																																
	Post-class	4.74	.541				Will be able to complete the final project based on case projects	Pre-class	4.30	.661	-.315	57	.754	Post-class	4.36	.953	Invest more time vs. paper and pencil tests	Pre-class	4.00	.667	.000	38.495	1.000	Post-class	4.00	.853																																																																												
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	Post-class	4.00	.853																																																																																																			

Summary

Results of the study show that students perceive authentic assessment methods to be a good measurement of competency in the Introduction to Networking course at WCTC. The study also shows that there are very little differences in the perceptions of authentic assessment based on gender, age, and education level. Student perceptions of authentic assessment were very positive and follow what prior research has shown. There were significant changes in the perceptions of authentic assessment after students completed the course and experienced the assessment process first-hand.

Chapter V: Summary, Conclusions, and Recommendations

The purpose of this study was to determine the effectiveness of authentic assessment methods implemented in three sections of the Introduction to Networking course. This chapter will summarize the study; state conclusions based on the stated research questions, and present recommendations based on the findings of the research.

Summary

Of the many assessment methods in use in post-secondary education, research has shown that authentic or performance-based assessment is the preferred assessment method. Many post-secondary instructors are using these assessment methods in their courses, however, authentic assessment methods are not being implemented in the Information Technology (IT) Network Specialist program at Waukesha County Technical College (WCTC).

The study conducted during the spring semester of 2007 in three sections of the Introduction to Networking course at WCTC used a survey instrument created by the researcher to address the four research questions stated in Chapter I. The survey was designed to collect quantitative as well as qualitative data. Quantitative data consisted of demographic statistics of the sample and answers to statements using a 5-point Likert scale in order to analyze the advantages of authentic assessment in measuring competency as well as to identify the positive and negative perceptions of authentic assessment. Qualitative data consisted of two open-ended questions asking positive and negative perceptions of authentic assessment methods used in the course. Two similar surveys using different verb tenses were created in order to do a comparative analysis on perceptions of authentic assessment prior to and upon completion of a course with

authentic assessment methods. These two surveys were administered during the spring semester at WCTC; one at the beginning the semester and one at the end. The three sections of the Introduction to Networking course that were surveyed were taught by the original developer of the course curriculum and both surveys were administered at the beginning of the class session.

Prior to participating in the study, students were informed that participation in the study is anonymous, confidential, and voluntary. They were also informed of the risks and benefits in participating the in the study and given instructions on how to complete the survey. The survey was administered via the online survey tool offered through the University of Wisconsin Stout (University of Wisconsin Stout Board of Regents, 2006). Results were reported through the survey tool and sent to the University of Wisconsin Stout for statistical analysis.

Conclusions

1. What are the advantages of authentic assessment in measuring competency by students in the Introduction to Networking course by students at WCTC?

The study found that authentic assessment is beneficial in measuring course competency. A majority of students agree with the assessment methods used in the course in terms of how they assess competency. A majority of the respondents “strongly agreed” or “agreed” when asked whether “the assessments showed that I am able to... [Perform the course competency]”. Overall perception of competency in both surveys was high with mean values of ≥ 4 for each competency with the competency “Work in a team setting to complete a collaborative project” scoring a 3.87 in the post-class survey. This finding may reflect that there was of lack of participation in the group project that

resulted in many students working on their own or that the assessment used was not appropriate in measuring this competency. Respondent comments from the qualitative open-ended questions state the some advantages of authentic assessment in measuring competency. They state: “the [group] presentations were a good way to learn”, “I am [able to] identify where I was in the IT world”, “I know more today about computers, troubleshooting, wireless, and networking,” “the assessments were foundational in that they helped you learn material from the ground up”, “[there was a] variety of scenarios [in the case projects] that allowed you to implement anything you wanted by validating your reasons.”

2. Are there differences in the perception of authentic assessment by students based on selected demographic factors in the Introduction to Networking course at WCTC?

Results of the study show little to no significant difference in the demographic factors of gender, age, and education level in respect to the perception of authentic assessment methods used in the Introduction to Networking course. This indicates that demographics don't have an impact on perceptions of authentic assessment and that different types of students perceive authentic assessment in a similar manner. Survey results seem to indicate that female students are willing to invest more time in completing the course assessments. The female population is a minority in the Information Technology field and has to work very hard to keep up in order to be competitive with the male-dominated field. The fact that females are willing to invest more time seems to indicate this motivation. Additionally, those in the 31 and older age group show lower confidence in completing the final project based on case projects and are less likely to

invest more time in the assessments vs. paper and pencil tests. This seems to indicate that the older population is more comfortable with paper and pencil tests and those closer to high-school prefer authentic assessment. Those with post-secondary degrees enjoyed working on the classroom assessments more than those with a high school diploma/GED. Those with post secondary degrees were also in agreement that there were a variety of assessments used and that the scoring rubrics were easy to understand.

3. What are the positive and negative perceptions of authentic assessment by students in the Introduction to Networking course at WCTC?

Based on the results of the responses to the statements using the 5-point Likert scale answers, there was an overwhelming positive perception of authentic assessment. The a majority of students responded with either “strongly agree” or “agree” regarding their understanding of the assessments used in the course, their motivation to complete the assessments, and the ability to retain what they learned in the course, the ability to apply what they learned. They also felt that the assessment process was a fair measurement of their abilities and they enjoyed working on the assessments. They felt that there was a good variety of assessments, that the assessments were a good measurement of what they learned, they felt that the scoring rubrics were easy to understand and were able to complete the final project based on the assessments done throughout the course of the semester. Finally, a majority, “strongly agree” and “agree” that they invested more time in working on the assessments vs. studying for paper and pencil tests. This is an indication of the positive perceptions of the authentic assessment methods implemented in the course. No negative perceptions were found in the perception statements answers. Perceptions of authentic assessment based on the

qualitative data gathered from open-ended questions show a high large amount of positive responses regarding the perceptions of the assessment methods used in the course. Respondents state that they are practical, hands-on, involve active-learning, and varied. The positive and negative perceptions of authentic assessment in this study are consistent with what other researchers have found as noted in Chapters 1 and 2. Students don't always like authentic assessment because they are more time consuming and they force them to work harder to find the details, however, the result is higher retention, more enjoyment, active learning, variety, and a fair measurement of their abilities. The study shows that there are many benefits to authentic assessment and that student's perceptions of the authentic assessment process are positive. They prefer the practical, hands-on nature of authentic assessment to the standard paper and pencil testing methods.

4. Is there a difference in perceptions about authentic assessment by students prior to and upon completing the Introduction to Networking course at WCTC?

Results of the study show that there is a difference in perceptions about authentic assessment by students prior to and upon completing a course using authentic assessment methods. The majority of perceptions were not significantly different; however there were significant increases in mean values with respect to the fairness of the assessments, the enjoyment of working on the assessments, the variety of assessments, appropriate measurement of learning, and understanding of scoring rubrics. The mean values in each of these perceptions showed a significant increase and may indicate a positive reflection on the authentic assessment methods used. This may also indicate that the authentic assessment methods used in the course were appropriately implemented. After experiencing authentic assessment first-hand, students found them to be fairer than they

originally expected. This may be connected to the use of scoring rubrics to grade the assessments and the lack of subjectivity in the grading process due to the use of scoring rubrics. Rubrics were presented to students with the assessments so students knew what the scoring expectations were before they began working on an assessment. Also, students that didn't think they would enjoy the assessments found that they were more enjoyable than paper and pencil tests. This may indicate that the performance-based and hands-on nature of the assessments is more enjoyable than standard tests. They also found the assessments to be appropriately varied vs. their original perception. Students enjoyed the different assessment activities rather than being graded on paper and pencil tests. They found authentic assessment methods to be a better way of measuring learning than they originally thought. Again, this may be a result of the hands-on nature of the assessments used in the course.

Recommendations

The following recommendations are made based on the findings from this study.

1. Authentic assessment methods should be considered in all courses in the Information Technology (IT)-Network Specialist program at Waukesha County Technical College (WCTC). The performance-based and hands-on nature of authentic assessment has many benefits that increase student learning and retention. This change will involve a major change in the curriculum that is currently in use and a large time investment by the faculty to implement these changes.
2. This study was conducted using a very small sample of the population at WCTC. The study needs to be done using a larger sample size in order to

make conclusions about the overall perceptions of authentic assessment at WCTC.

3. Further research needs to be done to make conclusions about the impact of authentic assessment on the drop-out rate. There is a significant increase in the drop-out rate since the implementation of authentic assessment in the Introduction to Networking. A study needs to be conducted to determine if there is a connection between authentic assessment and the drop-out rate increase.
4. Faculty in the IT-Network Specialist program at WCTC should go through training to learn how to implement authentic assessment methods in their courses to ensure that the assessment process is consistent for students enrolled in the program.
5. Further research needs to be conducted to compare the perceptions of authentic assessment by different faculty members at WCTC in order to make conclusions about the fairness that can be achieved by using authentic assessment vs. traditional testing methods.
6. Reliability of validity of the survey instrument may be improved by completing a 2X2 matrix of the questions and making changes based on additional feedback. Also, if the survey was administered using confidential identifiers, additional comparative analysis of pre-class and post-class data could be used.

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Appendix A: Survey #1

Authentic Assessment-pre



Demographics

1. Are you:

Male

Female

2. What is your age?

3. What is the highest level of education you have completed?

4. Please answer the following questions.

**Strongly
Agree**

Agree

Neutral

Disagree

**Strongly
Disagree**

I understand the assessments that will be used in the course.

I am motivated to complete the assessments.

I will be able to retain what I have learned.

I will be able to apply what I've

apply what I've learned outside of class.

The assessment process is a fair measurement of my abilities.

I will enjoy working on the classroom assessments.

There are a variety of assessments.

The assessments will appropriately measure what I am learning.

Scoring rubrics are easy to understand.

I will be able to complete the final project based on completing the case projects.

I will invest more time in completing the assessments vs. studying for paper and pencil tests.

The assessments will show that I am able to identify network topologies used today and design a network using these topologies.

The assessments will show that I am able to assess when to apply the appropriate networking hardware.

The assessments will show that I am able to identify and define Network protocols.

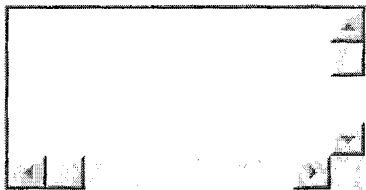
The assessments will show that I am able to assess when to apply the appropriate network architectures.

The assessments will show that I am able to identify the daily tasks involved with managing and troubleshooting a network.

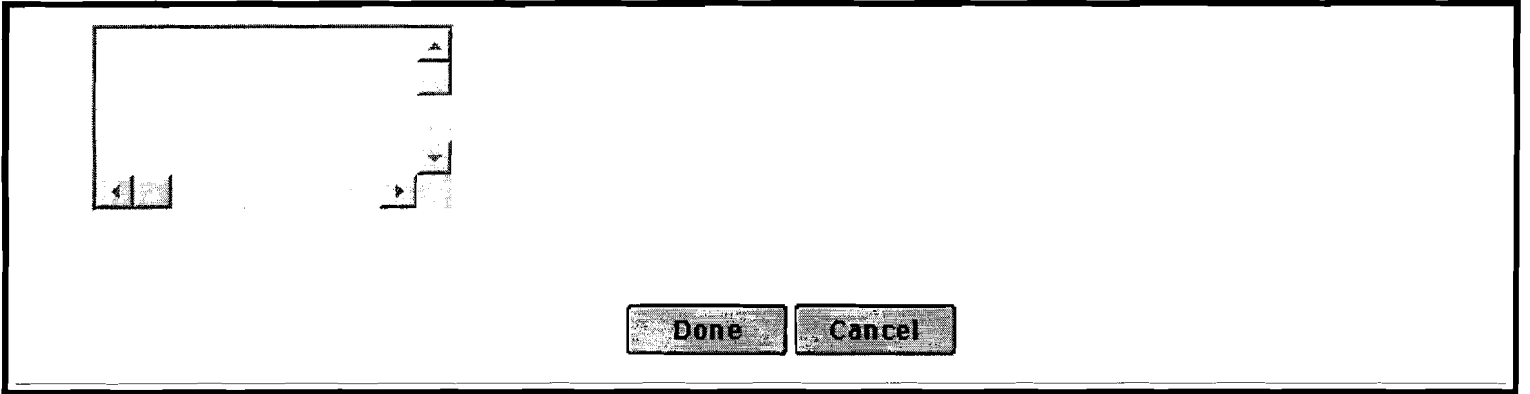
The assessments will show that I am able to reflect on the use of Networking in a business or home user setting.

The assessments will show that I am able to work in a team setting to complete a collaborative project.

5. What do you like about the course assessments?



6. What do you dislike about the course assessments?



Appendix B: *Survey #2*

Authentic Assessment-post

Page 1 of 1



outside of class.

The assessment process was a fair measurement of my abilities.

I enjoyed working on the classroom assessments.

There was a variety of assessments.

The assessments appropriately measured what I learned.

Scoring rubrics were easy to understand.

I was able to complete the final project based on completing the case projects.

I invested more time in completing the assessments vs. studying for paper and pencil tests.

The assessments showed that I am able to identify network topologies used today and design a network using these topologies.

The assessments showed that I am able to assess when to apply the appropriate networking hardware.

The assessments showed that I am able to identify and define Network protocols.

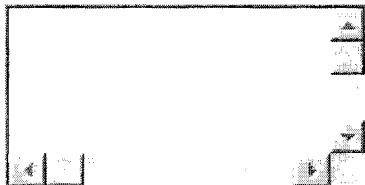
The assessments showed that I am able to assess when to apply the appropriate network architectures.

The assessments showed that I am able to identify the daily tasks involved with managing and troubleshooting a network.

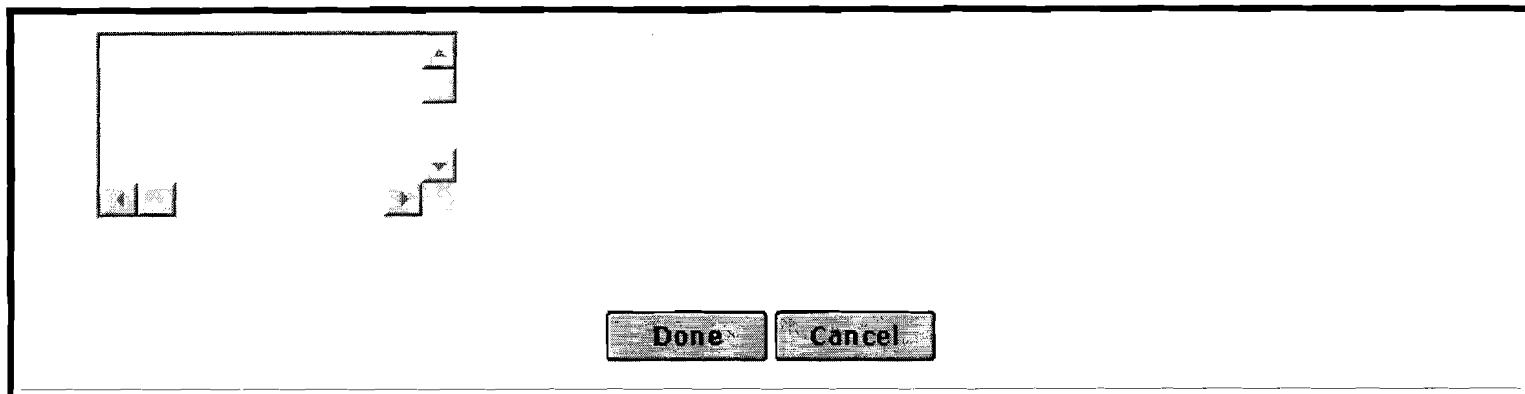
The assessments showed that I am able to reflect on the use of Networking in a business or home user setting.

The assessments showed that I am able to work in a team setting to complete a collaborative project.

5. What did you like about the course assessments?



6. What did you dislike about the course assessments?



Appendix C: *Implied Consent Form*

UW-Stout Implied Consent Form for Research Involving Human Subjects

Consent to Participate In UW-Stout Approved Research

Title: An Analysis of Authentic Assessment in an Information Technology Class at WCTC

<p>Investigator: Melissa Seamonson IT-Networking Instructor Waukesha County Technical College</p>	<p>Research Sponsor: Dr. Howard Lee M.S. CTE Program Director UW-Stout</p>
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Description:

Your instructor is completing a study on the use of authentic/performance-based assessment methods in the Introduction to Networking Course at Waukesha County Technical College. You have been asked to participate in this study by completing the following survey. A similar survey will also be conducted at the completion of this course.

Authentic assessment is a form of assessment in which students are asked to perform real-world tasks that demonstrate meaningful application of essential knowledge and skills -- Jon Mueller

Assessments used in this course include: Case projects, Reflective Learning Discussions, Network Design Project, Collaborative 'Create a Quiz' project, and E-Portfolio.

Risks and Benefits:

There are little risks in participating in this study as you will remain anonymous and participation is voluntary. The Information Technology Department will be using the results of the study to determine the effectiveness of authentic assessment in an Information Technology class at WCTC.

Time Commitment and Payment:

The accompanying online survey will take approximately 10 minutes of your time. There is no monetary compensation for your time.

Confidentiality:

The study is completely anonymous. Names will not be included on any documents and this informed consent will not be kept with any of the other documents completed with this project.

Right to Withdraw:

Your participation in this study is entirely voluntary. You may choose not to participate without any adverse consequences to you. Should you choose to participate and later wish to withdraw from the study, you may discontinue your participation at this time without incurring adverse consequences.

IRB Approval:

This study has been reviewed and approved by The University of Wisconsin-Stout's Institutional Review Board (IRB). The IRB has determined that this study meets the ethical obligations required by federal law and University policies. If you have questions or concerns regarding this study please contact the Investigator or Advisor. If you have any questions, concerns, or reports regarding your rights as a research subject, please contact the IRB Administrator.

Investigator:

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Statement of Consent:

By completing the following survey you agree to participate in the project entitled, "An Analysis of Authentic Assessment in an Information Technology Course at WCTC."