

Student technology competencies: A follow-up report for the Western Carolina
University Faculty Senate

Prepared by

The Student Computer Requirement Committee

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Executive Summary

The Faculty Senate of Western Carolina University requested follow-up to a fall 2005 report concerning student computer technology competencies. Both local and national data were used to establish competency levels for Western students. The National Education Technology Student (NETS) assessment from the International Society for Technology in Education (ISTE) was administered locally to a sample of second semester freshman. A 2005 ECAR study was chosen as another data source along with self-assessment data gathered from entering teacher education students at Western.

The sample for this study involved 24 students from two Health and Wellness classes and two English Composition classes attending in spring 2006. Students were asked to self-assess in a paper-based assessment, their skill levels with word processing, presentation, spreadsheet, database, and Web software using questions from the ECAR study. Students then took a 5-part, hands on NETS assessment to measure these same skills.

Results clearly indicate that students rate themselves higher in technology skills than their actual performance level. On average, students rated themselves skilled in word processing with a mean of 4.17 but scored a failing 56% on the hands on assessment. Scores ranged from an average of 62 out of 100 points on spreadsheet software to 3 out of 100 on database software. Additionally, national data indicate that students' technology engagement is driven by course assignments.

The Student Computer Requirement Committee requests Western's Faculty Senate to embrace the need for student technology competencies and request support for working with the Liberal Studies Committee to identify specific student technology competencies. Second, the Committee requests support to utilize those selected student competencies by integrating technology enhanced instructional activities into the Liberal Studies curriculum and by exploring opportunities in freshman composition, health and wellness and communications.

The Faculty Senate of Western Carolina University requested follow-up to a fall 2005 report concerning student computer technology competencies. In a report presented by Dr. Scott Philyaw in 2005, results were shared from an ad hoc committee charged by the Faculty Senate to examine Western's student computer ownership requirement. This report offered several recommendations concerning student technology skill sets and as a result the Faculty Senate requested additional research specifically concerning student technology competencies to substantiate those recommendations.

This report provides the requested research by sharing the results of both local and national student assessment data gathered from multiple sources. The National Education Technology Assessment from the International Society for Technology in Education (ISTE) was administered locally to measure second semester freshman technology skills as related to national eight grade competencies. Other sources include an EDUCAUSE Center for Applied Research (ECAR) national study which gathered self-assessment data for student technology skills and provided insight into student technology engagement. Another source is technology self-assessment data routinely gathered from entering teacher education students at Western using the National Education Technology Assessment for Teachers as established by ISTE.

Research Design

To determine student computer competencies levels at Western, the research design sought national data to establish competency standards. The ECAR study was chosen as a data source for two reasons, it was national in scope but provided local data for comparative analysis. This study provided comprehensive national data on student self-assessment of technology skills and provided insight into student use of technology

and for student technology engagement. Western was a participant in this study and was provided a local data set enabling local comparisons to national data. The ECAR data were reaffirmed by comparing the local ECAR data set against the National Education Technology Assessment for Teachers. This assessment is administered locally to students entering teacher education at Western and asks them to rate their technology competencies in certain areas. These data sets enabled analysis of national student technology skills self-assessment.

The final data set was gathered from a sample of currently enrolled second semester freshmen at Western. Students from Health and Wellness classes and from Freshmen Composition classes were asked to volunteer for this study. These freshmen volunteers were asked to complete an ECAR based self-assessment instrument and then complete the NETS hands-on assessment measuring skills in word processing, spreadsheet, presentation and Web browser software. This data set allowed direct comparison of student self-assessment data with actual hands on assessment data. These instruments were administered by the Student Technology Assistance Center during a two week period in April, 2006.

NETS Assessment

The International Society for Technology in Education (ISTE) is an organization providing leadership for educational technology to improve and advance the effective use of technology in K-12 education. The Society's work includes developing assessment tools for teachers to determine student progress in meeting national technology competencies. The NETS Online Technology Assessment (A Microsoft Corporation and ISTE collaboration) helps teachers measure student skills in using software applications.

Currently, the State of North Carolina utilizes the NETS assessment for testing all graduating 8th grade students. The assessment includes hands on activities measuring technology skills as well as the integration of technology as related to problem solving.

The NETS materials and testing environment enable students to engage in assessment experiences that are performance based and more authentic and robust than those based solely on question/answer tests. The assessments are very authentic in the sense that students undertake tasks using the same real-world tools they might use to complete these tasks outside of school. The assessment environments are robust in that they use the fully functioning versions of the software students are asked to use rather than simulations of the software tools. As a result, students have all the tools and can pursue all the strategies they would use in real-world environments. Assessments of this kind involve not only assessing whether students have learned to use technology, but whether they can use technology to learn (e.g. problem solve, make decisions). A companion part of the assessment used select questions from the ECAR study asking students to self-rate their skill in the following software. (Appendix A)

- Word Processing
- Spreadsheet
- Database
- Presentation
- Web

The sample for this study involved 24 students from two Health and Wellness classes and two English Composition classes attending in spring 2006. Students involved

were volunteers who chose to participate for extra credit in their respective course and to be entered into a drawing for an Apple Ipod mp3 player.

Results

The self-assessment activity asked students to rate their skills in the five software areas using a 5 point Likert scale with 1 indicating “do not use,” 2 indicating “very unskilled,” 3 indicating “unskilled,” 4 indicating “skilled,” and 5 indicating very skilled. Participation also consisted of answering a 10 question, paper self-assessment based upon the ECAR national study. The self-assessment returned the following results.

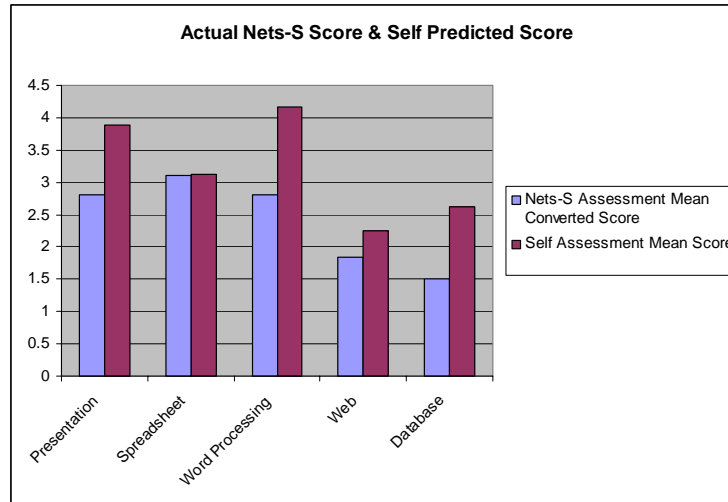
Software	Word Processing	Spreadsheet	Database	Presentation	Web Publishing
Mean Score	4.17	3.13	2.63	3.88	2.25

For the hands on assessments the students in the sample completed 5 specific modules of the 12 module ISTE NETS-S assessment. The tests were scored on a 100 point system with a score of 70 indicating passing. This assessment returned the following results.

Software	Word Processing	Spreadsheet	Database	Presentation	Web Publishing
Mean Score	56	62	3	56	37

In comparing the scores of students’ self-assessment and hands on assessment of their skills and abilities with certain computer applications, it is clear to see that these students judge themselves as more proficient than they can actually perform. For example, on average, students scored themselves skilled in word processing with a mean of 4.17 but scored 56% on the hands on assessment. It is also worth noting that on

average, that 62 was the highest mean score for students participating in this study on all of the test modules (remember that these assessments were designed for graduating 8th grade public school students). A comparison of the data is attempted by converting the 100 points scale to the 5 point Likert scale where a score of 100 relates to 5 on the scale and a score of 50 equals 2.5.



Assessment results clearly indicate that this student sample of second semester freshmen scored less than what would be considered passing using university grading criteria on all of the 8th grade technology competency tests.

ECAR Study

The EDUCAUSE Center for Applied Research (ECAR) conducted a study in February, 2004 and again in 2005 to understand student use of information technology. The study involved 63 universities and engaged over 18,000 students. From gaming stations to personal computers and homes with Internet connectivity, the generation of students surveyed is referred to as the “NET GEN” or the Network Generation. The survey results confirmed that students today are the most “connected” generation ever, interacting with their peers over cell phones and instant messaging and through

instructional technology systems. Subsequently it is no surprise that the collaborative aspects of education technologies were ranked most favorable by the students.

Western Carolina University participated in the 2005 ECAR study and was provided a detailed analysis of local student data with comparisons to national data. In focusing on the data that Western Carolina University students submitted as part of this survey, it is clear there are some minor differences in local self-assessment rates when compared nationally in respect to skill with particular applications. However, there are many commonalities when comparing other ratings. (Appendix B) For example, 30% of Western students rate their general technology skills at a “skilled” level, the same as the national student sample while 4% percent more Western students rate their general technology skills at the “very skilled” level than compared to the national sample. The same comparison holds true for the student self-assessment of the use of library resources, a slightly larger percent of Western students rate themselves “very skilled.” By a few percentage points Western students tended to rate themselves “very skilled” at a higher rate than the national sample in word processing, presentation, graphic and Web development. Local students rated themselves a few percentage points lower when combining the “skilled” and “very skilled” level for spreadsheet software. When comparing the local and nation data no serious marked differences become apparent other than Western students tended to rate their technology skills at a slightly higher skill level by a few percentage points in a few areas. Comparison data are available in appendix A.

When looking at the 2005 national survey data, student access to computers is saturating the population as 93.4% of the students surveyed reported owning a computer. While 63.5% of freshmen own laptops, only 49.3% of seniors own laptops. Freshmen are

now buying laptops because of mobility factors as well as lower pricing. Another factor is that many residence hall rooms are small, and the laptop saves space over a traditional desktop computer. Personal digital assistants are owned by only 12.6% of the population, while 90.1% reported having a cellular telephone (Caruso & Kvavik, 2005).

Essentially, all students have access to Internet services, most have broadband connectivity, 25% have wireless capability, and students use these services for educational purposes, for communication and for entertainment. The primary use of computers by students at 99.7% was in accessing the Internet for e-mail and classroom related activities. Word processing for writing papers followed closely at 98.9% as reported by with students. Hours of student computer use ranged from a high mean of 4.01 hours per week in relation to studying and classroom activities to a low mean of 1.34 hours per week using the technology to produce multimedia content (Caruso & Kvavik, 2005).

Students rated themselves skilled at using word processing and in using the technology for communication with a mean of 3.6, on a scale of one being unskilled to four being highly skilled. With a mean of 2.07, they rated themselves somewhat lower at higher skilled tasks of multimedia production. Not surprisingly, seniors rated themselves higher in presentation skills than did freshmen. (Appendix B) The qualitative data indicated that students' skill levels were closely tied to requirements for the curriculum. In other words, interview data indicated that students had just enough technology skills to pass their courses. Their skill level did not go much deeper than what was required, and it tended to center on the basic office suite (Caruso & Kvavik, 2005).

Classroom and communication activities dominate when looking at hours of use. These hours include multitasking as the norm which is typified by engaging in a number of tasks simultaneously such as instant messaging, Web browsing, and word processing. Sadly, the implications of the study are that students are learning only enough technology to get by, and the focus is more about convenience and less about learning. Another driver of technology use was one of students being employed in situations where technology is required (Caruso & Kvavik, 2005).

Other key implications learned from this ECAR study are:

- There is a need for increased student literacy with technology.
 - Students overestimated their technology skills but were cognizant of the lack of skills in higher applications.
 - Skill sets diminished as complexity of specialized applications increased. Curriculum was the key driver of skills for higher order technology skill sets.
- Students liked a higher level use of technology when it was presented well by the faculty.

NETS-T Self-Assessment

The College of Education and Allied Professions annually gathers self-assessment data on computer competencies for first/second semester sophomores making application to the Teacher Education program (www.ceap.wcu.edu/etsi). Students rate themselves from a novice level of entry level skills, through mentor levels capable of coaching and facilitating others use in technology. Areas surveyed include the student's ability to use operating systems; word processing; spreadsheet; database; Web pages; multimedia; and

presentation software as well as the student's ability to engage in troubleshooting. These competency areas were established as part of the International Society for Technology in Education (ISTE) National Technology Standards for Teachers (NETS-T). The self-reporting classifications include:

- NOVICE: *Completely new to the experience, skill, tool or knowledge.*
- INTERMEDIATE: *Recognize the skills and knowledge and can begin to apprentice and practice these standards into teaching.*
- MASTER: *You are able to integrate skills and tools and can create authentic technology-based teaching and learning artifacts.*
- MENTOR: *Facilitate the development of integrated, technology-based learning units and environments using these skills and tools.*

It is important to keep in mind the context for this reporting as results should not be interpreted as strict self-reporting of technical competency alone. The competency surveyed these skill areas set in the context of student's ability to use these skills in a teaching/learning environment.

During the reporting period of Spring 2004 to Spring 2006, students generally rated themselves Novice to Intermediate on *Operating Systems, Troubleshooting, and Spreadsheets* and predominately Novice on *Database, Web Pages, and Presentation Software*. Students self-reported themselves as Intermediate or Master on *Word Processing*. From spring 2005 to current, there was a slight increase in self-assessment on *Operating Systems, Spreadsheets and Presentation Software* (more indicating Intermediate to Master). Very few students reported skill levels at the Mentor level for any one area but the strongest area of self-reporting (at the Master level) was *Word*

Processing. These results indicate that while proficient at writing papers students report being at the entry or exploratory skill level for most other software packages.

Discussion

Three main conclusions may be drawn from the data analysis. The first is that Western students tend to over estimate their technology skills. Second, second semester Western students are performing below eighth grade technology competency levels in the use of word processing, spreadsheets, database, presentation, and Web software. Thirdly, student technology engagement is driven by course assignments and curriculum requirements. Given these three conclusions, the recommendation is for Western to integrate technology into the curriculum and provide ways for the building of competencies if students are to have the technology skills necessary to compete in a global environment.

One concern in meeting this recommendation for integrated technology is that faculty must remain teachers of the discipline using the technology as a tool to enhance student learning rather than using valuable class time to teach the technology. Faculty wanting to integrate technology into their teaching must be able to assume that students enter their class with certain technology skill sets. This assumption on the part of faculty can become a reality if the University collectively embraces the following concepts:

- Faculty must be able to assume certain student computer skills when creating lesson activities that integrate technology to enhance student learning.
- All entering students must demonstrate basic technology competencies as indicated by a Student Technology Competency Assessment administered by academic support areas.

- Appropriate remedial activities and learning opportunities are provided for students by academic support units to obtain necessary technology competency levels.
- Students must pass the Student Technology Competency Assessment before registering for second year courses or demonstrate active engagement in remedial activities.
- Appropriate support is provided to ensure students have access to assistance and resources to complete Liberal Studies lesson activities that utilize technology to enhance student learning.

Conclusion

The Student Computer Requirement Committee requests Western's Faculty Senate to embrace the concept of student technology competencies. The desire of this committee is to work with the Liberal Studies Committee to identify the desired specific student technology competencies and capitalizing on those competencies, integrate technology enhanced instructional activities into the Liberal Studies curriculum. Specifically, opportunities exist to integrate technology into freshman composition, health and wellness and communications courses. The Student Computer Requirement Committee looks forward to a positive response and in building upon its work over the past eighteen months.

References

Caruso, J., & Kvavik, R. (2005). Key findings students and information technology 2005: Convenience, connection, control, and learning. EDUCAUSE Center for Applied Research, 1-10. Retrieved March 30, 2006 from <http://www.educause.edu/ir/library/pdf/ERS0506/ekf0506.pdf>

Appendix A Self Assessment Form

<p>How many hours per week do you spend creating word processing documents</p>	<ul style="list-style-type: none"> <input type="radio"/> Do not use <input type="radio"/> Less than an hour <input type="radio"/> 1-2 hours <input type="radio"/> 3-5 hours <input type="radio"/> 6-10 hours <input type="radio"/> 11-15 hours <input type="radio"/> 16-20 hours <input type="radio"/> More than 20 hours
<p>How many hours per week do you spend creating presentations</p>	<ul style="list-style-type: none"> <input type="radio"/> Do not use <input type="radio"/> Less than an hour <input type="radio"/> 1-2 hours <input type="radio"/> 3-5 hours <input type="radio"/> 6-10 hours <input type="radio"/> 11-15 hours <input type="radio"/> 16-20 hours <input type="radio"/> More than 20 hours
<p>How many hours per week do you spend creating spreadsheets</p>	<ul style="list-style-type: none"> <input type="radio"/> Do not use <input type="radio"/> Less than an hour <input type="radio"/> 1-2 hours <input type="radio"/> 3-5 hours <input type="radio"/> 6-10 hours <input type="radio"/> 11-15 hours <input type="radio"/> 16-20 hours <input type="radio"/> More than 20 hours
<p>How many hours per week do you spend creating databases</p>	<ul style="list-style-type: none"> <input type="radio"/> Do not use <input type="radio"/> Less than an hour <input type="radio"/> 1-2 hours <input type="radio"/> 3-5 hours <input type="radio"/> 6-10 hours <input type="radio"/> 11-15 hours <input type="radio"/> 16-20 hours <input type="radio"/> More than 20 hours
<p>How many hours per week do you spend creating web pages</p>	<ul style="list-style-type: none"> <input type="radio"/> Do not use <input type="radio"/> Less than an hour <input type="radio"/> 1-2 hours <input type="radio"/> 3-5 hours <input type="radio"/> 6-10 hours <input type="radio"/> 11-15 hours <input type="radio"/> 16-20 hours <input type="radio"/> More than 20 hours
<p>Please rate your skill level for using word processing software</p>	<ul style="list-style-type: none"> <input type="radio"/> Do not use <input type="radio"/> Very unskilled <input type="radio"/> Unskilled <input type="radio"/> Skilled <input type="radio"/> Very Skilled

Please rate your skill level for using presentation software	<input type="radio"/> Do not use <input type="radio"/> Very unskilled <input type="radio"/> Unskilled <input type="radio"/> Skilled <input type="radio"/> Very Skilled
Please rate your skill level for using spreadsheet software	<input type="radio"/> Do not use <input type="radio"/> Very unskilled <input type="radio"/> Unskilled <input type="radio"/> Skilled <input type="radio"/> Very Skilled
Please rate your skill level for using database software	<input type="radio"/> Do not use <input type="radio"/> Very unskilled <input type="radio"/> Unskilled <input type="radio"/> Skilled <input type="radio"/> Very Skilled
Please rate your skill level for creating web pages	<input type="radio"/> Do not use <input type="radio"/> Very unskilled <input type="radio"/> Unskilled <input type="radio"/> Skilled <input type="radio"/> Very Skilled

Appendix B 2005 Comparison of Western and National Student Self-Assessment

