Strategies for Ensuring Computer Literacy Among Undergraduate Business Students: A Marketing Survey of AACSB-Accredited Schools

Bruce C. Hungerford
bhungerford@daltonstate.edu
Management Information Systems
Dalton State College
Dalton, GA 30720, USA

Joseph T. Baxter
jbaxter@daltonstate.edu
Management Information Systems
Dalton State College
Dalton, GA 30720, USA

Stephen LeMay
slemay@uwf.edu
Marketing
University of West Florida
Pensacola, FL 32514, USA

Marilyn M. Helms
mhelms@daltonstate.edu
Management
Dalton State College
Dalton, GA 30720, USA

ABSTRACT

There is broad agreement that college students need computer and information literacy for their studies and to be competitive as graduates in an environment that increasingly relies on information technology. However, as information technology changes, what constitutes computer literacy changes. Colleges have traditionally used the freshman- or sophomore-level course in microcomputer applications/introduction to computers to assure basic literacy. There has been much discussion in schools of business about whether today's entering students have enough experience in computer applications from high school and work experience to omit the course. There is also ongoing debate about the appropriate balance of theory and application, as well as the appropriate format for the course. This research used a questionnaire administered electronically via www.SurveyMonkey.com to poll individuals nominated by the deans of schools of business accredited by the Association to Advance Collegiate Schools of Business (AACSB) as being the most appropriate for completing a survey on their school's computer literacy requirements. The instrument requests information in the following areas: (1) demographic data about the respondents and the institutions they represent, (2)

the structure and content of their computer literacy programs, (3) whether students are allowed to test out of courses, and if permitted, how many try to test out, how many succeed, and what are the standards to test out, (4) the contents of their computer literacy programs with percentages of time devoted to various aspects of computer literacy, and finally (5) the respondents' views of major influences on computer literacy programs.

Keywords: IS research toward educators, pedagogy, IS undergraduate curriculum, teaching computer literacy, Association to Advance Collegiate Schools of Business, AACSB, survey

1. INTRODUCTION

There is broad agreement college students need computer and information literacy for their studies and to compete as graduates in an environment that increasingly relies on information technology. The challenge for universities is to ensure students meet a minimum level of competency when using constantly changing technology. However, with the ever-increasing change in information technology, what constitutes computer literacy and fluency changes and universal definitions do not exist (McDonald, 2004).

Colleges of business have traditionally used the freshman- or sophomore-level course in microcomputer applications/introduction to computers to accomplish basic literacy. Yet, schools of business continue to discuss whether today's entering students have enough experience in computer applications from high school and work experience to omit the course. The business community agrees students need less computer theory and more application in Windows, Word, Access, Excel and PowerPoint (Spinuzzi, 2006; Wilkinson, 2006). The academic community continues to debate the appropriate balance of theory and application, as well as the appropriate format for the course and whether it should be continued (Stephens, 2006; McDonald, 2004). Computer literacy too can take a variety of forms, including software literacy (or the ability to use systems and software to search the Internet for information, use e-mail, and personal productivity tools), technical literacy (concepts and definitions of various information technologies), and information literacy (the ability to use IT efficiently and effectively to accomplish tasks). Dickson, Astani, Eriksson, Lee-Partridge, & Adelakun (2000) agreed what most call "computer literacy" is really "software literacy."

2. BACKGROUND

Robinson and Thoms (2001) agreed the literature on computer literacy is extensive and covers populations from K-12 students, to college students, to business executives, and to the general public. Their longitudinal study of computer knowledge suggested varied definitions of computer literacy and a variety of tests and measures for the constructs.

Most computer literacy studies have focused on students' skill and success in the introduction to computers course, examining a variety of experience variables, demographic variables, and students' self-reported skill levels on a variety of microcomputer applications (for a summary, see Baxter, Hungerford, & Helms, 2011).

Studies assessing students' perceptions of their abilities to excel in computer courses have considered a number of variables, including gender (Busch, 1995; Qutami & Abu-Jaber, 1997; Messineo & DeOllos, 2005), gender of a student's mentor (Goh, Ogan, Ahuja, Herring, & Robinson, 2007), ethnic minority status (Wilkinson, 2006), age (Reed, Doty, & May, 2005), cognitive learning style (Shiue, 2003), computer access and past experience (Albion, 2001; Cassidy & Eachus, 2002; Webster, 2004), use of e-mail (Divaris, Polychronopoulou, & Mattheos, 2007), prior computer training (Creighton, Kilcoyne, Tarver, & Wright, 2006), software knowledge (Tien & Fu, 2008), blue-collar and/or unemployed parents (Tien & Fu, 2008), ACT scores (Creighton et al., 2006), and GPA (Baxter et al., 2011).

Relevance of the Computer Literacy Course

McGowan and Cornwell (1999) found students entering business programs are competent in the traditional computer literacy areas and may not need a computer literacy course, but will need an introduction to their institution's unique computer environment. They suggested

scheduling proficiency exams and seminars in proficiency areas instead of offering a course.
Jones and Healing (2010) made a case for today's new generation of young learners who are often described as the "Net Generation" or "Digital Natives." They linked young people's attitudes and orientations to their lifelong exposure to digital, networked technologies.

The Joint IS 2010 Curriculum Task Force (2010) recommended "dropping the course focusing on personal productivity tools from IS programs." While the Task Force found most colleges require basic computer literacy, it believed "[m]ost high schools are preparing students in this area before they reach a higher education environment." (p. 28)

Despite these findings, other studies of students' abilities have indicated the computer literacy course is still needed. For example, when testing a sample of students, Robinson and Thoms (2001) found students did not know any more about computer technology in entering their first college of business computer course at the time of their study than they had in the past.

Oblinger and Hawkins (2006) suggested that when faculty, staff, and administrators see how easily students use technology, they may mistakenly assume students have more than adequate IT competency. They questioned whether students are competent or just overly confident and cautioned having no fear is not the same as having knowledge or skill.

Hawkins and Oblinger (2006) found technology to be nearly ubiquitous on campus and, although conversations about the digital divide were relatively uncommon, it remained incorrect to assume all students own a computer or have an Internet connection.

In their research, Creighton, Kilcoyne, Tarver, and Wright (2006) asked two related questions: Is a freshman-level microcomputer applications/ introduction to technology course obsolete? Are students, especially new freshmen, enrolling in the course already computer literate? Their research found students enrolling in such courses were not literate in general computer technology and spreadsheet applications, but were computer literate in the more familiar and often used word processing, e-mail, and Internet applications.
Rondeau and Li (2009) agreed many colleges of business assume incoming students possess high levels of computer abilities and are allowed to pass a computer proficiency exam (CPE) in lieu of the introductory information technology (IT) course. Yet, their study found students who actually completed the information technology course scored better in subsequent IT courses, and that the pass rate on the CPE was lower than that of the course, creating a backlog of students not ready to move on to more advanced courses. The authors suggested a hybrid approach to ensure students have the IT skills they need to progress.

Others have validated tests for monitoring technology literacy, matching skills important to organizations with the technology skills students need, like the Student Tool for Technology Literacy (see Hohlfeld, Ritzhaupt, & Barron, 2010). Determining students' computer literacy needs is important, particularly as universities have limited computer training dollars to spend in today's economy, yet must continuously provide quality education for their students.

Jones, Windsor, and Visinescu (2011) found that, while current students are more comfortable with various information technologies, it would be a mistake to assume that they have the IT skills necessary for the business world or that they will be able to pick these skills up on their own.

Course Design

The computer literacy course has undergone significant change over time. For example, at one state college the authors are familiar with, prior to 1984 the course was primarily lecture-based and covered general computer hardware and software principles, as well as data processing organization and procedures. There was also some hands-on interaction with a mini-computer running programs written in the BASIC programming language. From 1984 through 1988 the course emphasized programming in BASIC. This approach was based on the idea that to really understand a computer, a student needed to understand the logic behind its programming. As more application software for microcomputers became available, it became clear most general business problems were actually being solved with productivity software running on microcomputers using the Microsoft operating system (MS-DOS and later MS Windows). This led to changing the course after 1988 from a programming course to a course emphasizing productivity software. Though

small adjustments have occurred over subsequent years as versions of Windows and Microsoft Office have changed, the course has maintained that emphasis to the present.

Since required computer literacy competencies continue to change at the high school level, it is important that universities monitor the design and content of the computer literacy curriculum to provide an adequate computer literacy background for students (Hindi, Miller, & Wenger, 2002).

Stephens (2005) developed a decision support system built around a self-efficacy scale that can be implemented to perform training needs assessment. The system can determine who requires training and which training mode is most appropriate. This proposed system would eliminate redundant services.

Sharkey (2006), in her study of information fluency and computer literacy, found universities are responding with a more rapid integration and adoption of technology and are emphasizing information use and retrieval.

Grant, Malloy, & Murphy (2009) studied student perceptions of their abilities as opposed to their actual abilities. The researchers redesigned the introductory computer course to concentrate on skill deficiencies in spreadsheets, while letting students show their proficiency in word processing and presentation software. To do this, the researchers required students to take more training to improve their deficient skills.

Hollister and Koppell (2008) studied the information technology course in an assurance of learning program in an undergraduate program at an AACSB-accredited business school to redesign the content and pedagogy of the computer literacy course. Mykytyn (2007) agreed that, while colleges of business have dealt with teaching computer literacy and computer application concepts for many years, teaching tool-related features in a lecture format in a computer lab may not be the best instructional mode. He suggested problem-based learning as an alternative for teaching computer application concepts, operationally defined as Microsoft Excel and Access. Ballou and Huguenard (2008) studied an introduction to computer course with both a lab and lecture component and found higher levels of perceived computer experience positively affected lecture and lab homework and exam scores.

Interestingly, students' skills seem to be changing with the pervasiveness of technology, with students preferring texting and the use of social media while college classes emphasize a variety of computer skills. Given the debate over the computer skills and abilities of today's students and on-going changes in computer literacy course design, it is necessary to first consider the state of the introduction to computers course in schools of business today.

3. METHODOLOGY

The primary research question for this project is simply this: What are AACSB-accredited business programs doing to ensure their students have the basic computer skills they need for further study and for the workplace?

Data Collection

We collected data for this project using a two-step process. First, we contacted the deans of AACSB-accredited undergraduate business programs in the United States. We asked them to identify the faculty member in their program who could best complete a survey on their computer literacy requirements. Second, we sent emails to the potential faculty respondents who were identified by their deans. The emails referred the potential respondents to a questionnaire on SurveyMonkey.com.

We initially emailed 416 business deans from the then list of 453 AACSB-accredited schools in the U.S. with an undergraduate business program. Of those, 32.0 percent identified a potential respondent. We emailed each of those contacts, receiving 92 responses for an effective response rate of 20.3% against the original sample of all AACSB-accredited undergraduate business programs in the U.S. Not all respondents answered all questions.

Survey Instrument

Based on the review of the literature and an expert panel of four faculty members, the questionnaire was designed, pre-tested with faculty not used in the final sample, and modified based on minor changes in wording, format, and order.

We begin answering the research question with demographic data about the respondents and the institutions they represented. We then

describe the structure and content of their computer literacy programs. We also look at whether students are allowed to test out of courses, how many tried to test out, how many succeeded, and what standards they must meet to test out. We follow that with our analysis of the contents of computer literacy programs and the amount of time devoted to each aspect of computer literacy. Finally, we discuss the respondents' views of major influences on computer literacy programs. The complete survey is presented in Appendix B.

Survey Population and Sample Demographics

We describe the academic background, age, gender and experience of the respondents in this section. Table 1 in Appendix A shows the academic positions, age ranges, gender, highest degrees, Academically Qualified (AQ) or Professionally Qualified (PQ) status, and academic fields of the respondents. Two things stand out in Table 1. First, the fields for the highest degree vary widely among the respondents. While many respondents have their highest degrees in MIS, they are far from the majority. The others have a wide variety of academic backgrounds. Secondly, a higher proportion of women responded than expected. Of the women, only ten had doctorates, but nine of those ten had doctorates in MIS.

Table 2. Characteristics of the Respondents' Institutions

Number of Business Students	#	Number of Total Students	#
<100	0	501-1000	0
101-200	2	1001-2000	3
201-300	3	2001-3000	3
301-400	3	3001-5000	8
401-500	2	5001-7500	13
501-750	9	7501-10,000	6
751-1000	14	10,001-15,000	10
>1000	41	>15,000	31

Table 2 shows few surprises. Since the survey was sent to faculty at AACSB-accredited institutions, the responses are biased toward larger business programs and larger institutions. Most respondents were at institutions having in excess of 1,000 business students and more than 10,000 total students. This suggests that the respondents reflect the population of AACSB-accredited business schools.

4. FINDINGS

The Structure of Computer Literacy Programs

We define the structure of computer literacy programs based on whether students are required to take specific classes, how many credit hours they take in those classes, and whether the school is on the quarter or semester system.

Table 3. Structure of Computer Literacy Programs

Please choose the answer that best describes the computer literacy requirements for your undergraduate business students.	#	%
They MUST take the same computer literacy course or courses as most other students, regardless of major.	23	28%
They MUST take a business computer literacy course or courses designed specifically for our business programs	49	60%
They MAY take courses from other areas (outside business) to meet the computer literacy requirements, but only if those courses are on a list approved by the business program	8	10%
They MAY take the same course as most other students, plus a computer course or courses designed for business.	1	1%
Other	10	

Table 3 shows how schools coordinate with their own courses and courses taught by other parts of their institutions. A substantial number of schools require business students to take the same computer literacy course as most other students, but the majority require them to take

a class designed specifically for business. Eight programs allow students to take courses outside business, but only if they are on an approved list. Only one respondent allows students to take the same courses as other students plus a course designed for business. The "Other" category produced responses in three conditions: (1) no computer literacy requirement, (2) computer literacy requirement covered by an on-line, no credit training program, and (3) computer literacy is integrated into other classes.

Table 4 shows the number of credit hours required by the responding schools. The majority of respondents, 43, indicated they require three credit hours in computer literacy courses. The next largest group, 14, required six hours (or two courses). A total of 14 respondents required less than three hours. Only four required more than six credit hours. The schools with many credit hours or very few credit hours tended to be very large or very small. The schools in the middle of our spectrum on size also tended to require the most common number of credit hours, three.

Table 4. Structure of Computer Literacy Programs—Credit Hours

How many credit hours do your undergraduate business students take to meet your computer literacy requirement? (Including business and non-business computing courses.)	#	%
1	9	11%
2	5	6%
3	43	52%
4	6	7%
5	2	2%
6	14	17%
7	1	1%
8	1	1%
9	2	2%

Eighty-one respondents were on the semester system and only ten on the quarter system. The number of hours required did not vary based on semesters versus quarters. Put another way, schools on the quarter system did not necessarily require more hours than those on the semester system. One of the ten schools on the quarter system indicated they were in the process of converting to semesters.

As Table 5 shows, most respondents, 47, do not allow students to test out of computer literacy requirements. Of those that do allow testing out, most, 25, allow students to test out of all the courses, while a few, 13, allow testing out of only part of the computer literacy requirement. The issue of testing seems to challenge how programs deal with computer literacy in an age when many students arrive on campus at least believing that they have considerable computer skills. The testing determines whether they have the right skills.

Table 5. Structure of Computer Literacy Programs—Testing Out Allowed

Please check the box beside the choice that best describes your computer literacy program.	#	%
Our business undergraduate students may test out of all our computer literacy courses.	25	29%
Our business undergraduate students may test out of some of their computer literacy courses.	13	15%
Our business undergraduate students are not allowed to test out of computer literacy courses.	47	55%

Table 6 shows that most students do not try to test out of computer literacy courses even though their business programs allow it. Only two respondents reported that more than half of their students tried to pass the computer literacy tests. At one of these schools, less than 25% of the students who tried the test, passed it; at the other, over 75% who tried the test, passed it. Both schools allowed unlimited attempts at the test (See Tables 6 and 7). If a high percentage of students attempt the test, then the school needs to have clear processes for such testing, especially at larger schools. The data suggest that even at schools where testing out of the course(s) is allowed, it is not encouraged.

Table 6. Structure of Computer Literacy Programs—Percent of students who try to test out.

Percentage ranges	#
0-10%	25
11-20%	7
21-30%	3
31-40%	0
41-50%	1
>50%	2

Table 7 suggests that students at some schools have a good chance of passing the test; but at other schools, a poor chance. Schools with more extensive coverage of operating systems and databases tended to have lower pass rates than those with less coverage of those topics.

Table 7. Structure of Computer Literacy Programs— The percentage of students who try to test out who passed the test.

Percentage ranges	#
0-25%	15
26-50%	10
51-75%	4
>75%	9

Most schools that allow students to test out required a 70% score to pass. A few required 80%; only one allowed students to pass with 60%. This is shown in Table 8.

Table 8. Structure of Computer Literacy Programs— Percentage score required to pass the computer literacy test.

Percentage score	#
60%+	1
70%+	27
80%+	13

Coverage: What AACSB Programs Teach in Computer Literacy Programs

As businesses use more and different software packages, programs, and systems, computer literacy requirements need to change. But first we need a benchmark for what computer literacy programs are doing now. This section examines what is being covered in computer literacy courses and what percentage of class time is being used for each topic, program, or package.

First, we look at what is being covered: We ask about operating systems, word processing packages, presentation packages, spreadsheets, databases, drawing programs, collaboration programs, email, Internet search, and more. Table 9 in Appendix A shows what percentage of class time is used for each of these topics. Some get little attention from any of the respondents; others get a great deal from nearly everyone, reflecting what most consider the core of computer literacy for business.

Spreadsheets dominate the percentages. Table 9 shows a rating score that simply assigns a ranking score to each percentage category in the choices: 1 for 1-5% and 6 for >50%. Using this scale, spreadsheets lead the rest in taking course time, followed by databases, presentation software, and word processing. Hardware concepts, software concepts, computer ethics, and operating systems take up a middling amount of time, while email, wikis, and drawing programs get little time.

Two topics that fell near the bottom deserve special comment: Internet search and social media. Both have significant business application at this point, but most programs spend little time on them, at least as part of computer literacy. They may cover them to a greater extent in classes that come later in the curriculum, but they get little attention as areas of computer literacy at most schools.

The "other" category got the second highest score on this rating system. The comments mentioned only one additional topic more than once: security was mentioned five times. Other commentators mentioned HTML, networking, data mining, supply chain management, and website design, but these were all single mentions.

Second, we look more specifically at what software is covered in the key, common areas. Table 10 in Appendix A shows the dominance of Microsoft. For operating systems, we found 18 different combinations of the operating systems shown. By far the most common was Windows 7 by itself, with either Vista or XP or both. But few schools spent a substantial portion of class time on operating systems; those that spent more time, covered more systems. One school covered every operating system listed; that school also spent 36-50% of its class time on operating systems. Word, Excel, and PowerPoint dominated their categories, as did Access, although a few schools also covered FilePro, SQL Server, or MySQL. Social media, Internet search, and collaboration tools, when covered, were focused mostly on the dominant packages: Facebook, Twitter, LinkedIn, Google, and Google Docs. Email, wikis, and drawing packages received little or no attention at most schools. Again, when they were covered, the coverage was primarily focused on the better known names: Visio, Gmail, Outlook, Google Sites, and Wikispaces.

Influences on Computer Literacy Programs

Our questions on these items used a five point Likert-type scale ranging from strongly agree to strongly disagree. In this section of the survey questionnaire, we asked for the respondents' degree of agreement with items related to students' computer skills and the influence of a list of factors on computer literacy programs: technology, student computer skills, budgets, state laws, and accreditation.

The first two items asked about the computer skills of traditional students (23 years old or younger) versus those of non-traditional students (24 and older). (This classification follows Justice, 2001.) More respondents thought non-traditional students had better skills than traditional students, but a substantial number were not sure about that choice. Most respondents thought that students come in with better computer skills now than five years ago. Most believe that the skill sets for computer literacy have changed in the last five years. Also, most respondents believe that the changes in student skills have driven changes in computer literacy courses.

Technology was the strongest driver of changes in computer literacy courses according to these respondents, followed by student skills, and amount of time available to teach the classes. A few saw state budgets and accreditation as restrictive, but most did not. Many state university systems enforce fairly strict limits on the number of hours required for degrees, which we believed might be more of an issue than it proved to be. Of course, these responses included private as well as public institutions, so that may influence this score. As a group, the respondents were uncertain whether they would add more computer literacy courses in the future. See Table 11 in Appendix A.

5. DISCUSSION & CONCLUSIONS

This research shows that computer literacy programs paid little attention to social media; and even when it is covered, only a limited range of applications is covered. There are dozens of applications, many receiving widespread use, especially in large businesses and multi-national corporations. Should these media be included in computer literacy or are these subjects of study in courses later in the curriculum (e.g., marketing, advertising, management, strategy, or MIS)? It is clear that students will need to know how to use social media for business purposes. But where do they fit into the curriculum? This question needs an answer.

This research is primarily descriptive. It profiles what AACSB-accredited business schools currently offer for computer literacy. It does not measure the success of the computer literacy course from the perspectives of students, of professors further along in the curriculum, or of employers who hire the products of these programs. These open issues suggest key directions for future research.

6. AREAS FOR FUTURE RESEARCH

More research is needed to assess the skills of incoming students as well. These skills still vary greatly, so business schools need processes for ensuring students have a specific set of skills appropriate for further study and for the workplace. This research also raises an even broader question: Are business schools teaching the correct topics and applications for computer literacy?

These programs have changed little since 1988, yet technology, students' computer skills, and

the needs of business have changed dramatically.

Suggested methodologies for this research would include a survey of one or more "expert" panels including employers and business and/or computer applications faculty. Similarly, research is needed to determine what skills students have prior to taking the course. If students are now more computer savvy and already have the needed skills, it is a waste of time and resources to require them to take computer literacy course(s). Is there an expert system or similar approach that can reliably assign students to groups that best match their computer skills? It may be that the course(s) should be broken into modules and a pre-test used to determine which (if any) modules the student should take.

While the AACSB is generally considered to be the most prestigious of the accreditation bodies for schools of business, there are two other Council for Higher Education Accreditation (CHEA) recognized business accreditation groups in the U.S.: (1) the Association of Collegiate Business Schools and Programs (ACBSP) and (2) the International Assembly for Collegiate Business Education (IACBE). More technical programs, such as those in Computer Information Systems, may be accredited by ABET, formerly the Accreditation Board for Engineering and Technology. Examination and comparison of the strategies used by these groups to ensure computer literacy among their undergraduate students might be illuminating.

7. REFERENCES

Albion, P. R. (2001). Some factors in the development of self-efficacy beliefs for computer use among teacher education students. *Journal of Technology and Teacher Education, 9*(3), 321-334.

Ballantine, J. A., Larres, P. M., & Oyelere, P. (2007). Computer usage and the validity of self-assessed computer competence among first-year business students. *Computers & Education*, *49*(4), 976-990.

Ballou, D. J. & Huguenard, B. R. (2008). The impact of students' perceived computer experience on behavior and performance in an introductory information systems course. *Journal of Information Systems Education, 19*(1), 87-97.

Baxter, J., Hungerford, B., & Helms, M. (2011). Predicting Success in the Introduction to Computers Course: GPA vs. Student's Self-Efficacy Scores. *Information Systems Education Journal, 9*(2), 75-94. Retrieved from http://isedj.org/2011-9/N2/ISEDJv9n2p75.pdf

Busch, T. (1995). Gender differences in self-efficacy and attitudes toward computers. *Journal of Educational Computing Research, 12*(2), 147-159.

Cassidy, S. & Eachus, P. (2002). Developing the computer user self-efficacy (CUSE) scale: investigating the relationship between computer self-efficacy, gender and experience with computers. *Journal of Educational Computing Research*, *26*(2), 133-53.

Creighton, W., Kilcoyne, M., Tarver, R., & Wright, S. (2006). Computer literacy levels of students enrolling in a post-secondary computer applications/ information technology course. *Information Technology, Learning, and Performance Journal, 24*(1), 15-23.

Davis, J. L. & Davis, H. (2007). Perceptions of career and technology and training and development students regarding basic personal computer knowledge and skills. *College Student Journal, 41*(1), 69-78.

Dickson, G.W., Astani, M., Eriksson, I. V., Lee-Partridge, J.E., & Adelakun, O. (2000). Exploring information technology literacy: An international perspective*. Proceedings of the Allied Academies International Conference, Academy of Information and Management Science, 4*(1), 43-47.

Divaris, K., Polychronopoulou, A., & Mattheos, N. (2007). An investigation of computer literacy and attitudes amongst Greek post-graduate dental students. *European Journal of Dental Education*, *11*(3), 144-147.

Goh, D., Ogan, C., Ahuja, M., Herring, S. C., & Robinson, J. C. (2007). Being the same isn't enough: Impact of male and female mentors on computer self-efficacy of college students in IT-related fields. *Journal of Educational Computing Research, 37*(1), 19-40.

Grant, D. M., Malloy, A. D., & Murphy, M. C. (2009). A comparison of student perceptions of their computer skills to their actual abilities. *Journal of Information Technology Education 8*, 141-160.

Hawkins, B. L. & Oblinger, D. G. (2006). The myth about the digital divide. *EDUCAUSE Review*, *41*(4), 12-13.

Hindi, N. M., Miller, D. & Wenger, J. (2002). Computer literacy: Implications for teaching a college-level course. *Journal of Information Systems Education*, *13*(2), 143-151.

Hohlfeld, T. N., Ritzhaupt, A. D., and Barron, A. E. (2010). Development and validation of the student tool for technology literacy. *Journal of Research on Technology in Education*, 42(4), 361-389.

Hollister, K. K. & Koppell, N. B. (2008). Curricular changes in response to assurance of learning results in information technology. *Journal of American Academy of Business*, *13*(1), 287-293.

Hsu, W. K. & Huang, S. S. (2006). Determinants of computer self-efficacy – An examination of learning motivations and learning environments. *Journal of Educational Computing Research*, *35*(3), 245-65.

Joint IS 2010 Curriculum Task Force. (2010). *IS 2010: Curriculum guidelines for undergraduate degree programs in Information Systems*. New York: Association for Computing Machinery and Atlanta: Association for Information Systems. Retrieved from http://www.acm.org/education/curricula/IS%202010%20ACM%20final.pdf

Jones, C. & Healing, G. (2010). Net generation students: Agency and choice and the new technologies. *Journal of Computer Assisted Learning*, 26(5), 344-356.

Jones, M. C., Windsor, J. C., & Visinescu, L. (2011). Information technology literacy revisited: An exploratory assessment. *ACM Inroads, 2*(2), 59-66.

Justice, E. M. (2001). Metacognitive differences between traditional-age and nontraditional-age college students. *Adult Education Quarterly*, *51*(3), 236-249.

McDonald, D. S. (2004). Computer literacy skills for computer information systems majors: A case study. *Journal of Information Systems Education*, *15*(1), 19-33.

McGowan, M. K. & Cornwell, L. (1999). Measuring computer literacy through the use of proficiency exams. *Journal of Computer Information Systems, 39*(3), 107-112.

Messineo, M. & Deollos, I. Y. (2005). Are we assuming too much? Exploring students' perceptions of their computer competence. *College Teaching*, *53*(2), 50-55.

Mykytyn, P. P. (2007). Educating our students in computer application concepts: A case for problem-based learning. *Journal of Organizational and End User Computing*, *19*(1), 51-61.

Oblinger, D. G. & Hawkins, B. L. (2006). The myth about student competency. *Educause Review, 41*(2), 12-13.

Qutami, Y. & Abu-Jaber, M. (1997). Students' self-efficacy in computer skills as a function of gender and cognitive learning style at Sultan Qaboos University. *International Journal of Instructional Media*, *24*(1), 63-74.

Reed, K. D., Doty, H., & May, D. R. (2005). The impact of aging on self-efficacy and computer skill acquisition. *Journal of Managerial Issue*s, *17*(2), 212-228.

Robinson, L. and Thoms, K. (2001). A longitudinal study of college student computer knowledge. *The Journal of Computer Information Systems, 42*(1), 9-12.

Rondeau, P. & Li, X. (2009). The impact of a computer proficiency exam on business students' admission to and performance in a higher-level IT course. *Journal of Information Systems Education, 20*(4), 477-485.

Sharkey, J. (2006). Towards information fluency: Applying a different model to an information literacy credit course. *Reference Services Review*, *24*(1), 71-85.

Shiue, Y. (2003). The effects of cognitive learning style and prior computer experience on Taiwanese college students' computer self-efficacy in computer literacy courses. *Journal of Educational Technology Systems, 31*(4), 393-410.

Spinuzzi, C. (2006). Multiliteracies for a digital age. *Journal of Business and Technical Communication, 20*(2) 225-228.

Stephens, P. (2005). A decision support system for computer literacy training at universities. *The Journal of Computer Information Systems*, *46*(2), 33-44.

Stephens, P. (2006). Validation of the business computer self-efficacy scale: assessment of the computer literacy of incoming business students. *Journal of Educational Computing Research*, *24*(1), 29-46.

Tien, F. F. & Fu, T. (2008). The correlates of the digital divide and their impact on college student learning. *Computers & Education, 50*(1), 421-36.

Webster, L. D. (2004). Measuring change in computer self-efficacy and computer literacy of undergraduates in an introduction to computers course. UMI *Dissertation Service.* (UMI No. 3164548).

Wilkinson, K. (2006). Students computer literacy: Perception versus reality. *Delta Pi Epsilon Journal, 48*(2), 108-20.

APPENDIX A

Table 1. Academic and Personal Demographics of Respondents

Academic Position	#	Highest Degree	#	Field of Highest Degree	#	Age	#	Years at School	#
Academic Staff	12	Doctorate	51	Computer Science	1	<25	0	<3 years	2
Instructor	14	Masters	23	Management Information Systems	26	26-35	3	3-5 years	7
Assistant Professor	3	**Gender**		Accounting	1	36-45	14	6-10 years	14
Associate Professor	11	Male	47	Quantitative Methods	3	46-55	22	>10 years	51
Full Professor	25	Female	26	Engineering	4	>55	33		
Adjunct	0	**AQ or PQ**		Education	12	**Tenure**			
Other (please specify)	10	AQ	45	MBA	10	Tenured	33		
		PQ	16	Information systems	3	Tenure track	12		
		Neither	3	Other	14	Non-tenure track	20		

Table 9. Topics in computer literacy classes and the percentage of class time devoted to each topic.

Please show which areas of computer literacy you cover and the percentage of class time devoted to each area.

Answer Options	1-5 %	6-10 %	11-20 %	21-35 %	36-50 %	>50 %	N/A	Rating Average	Response Count
Operating systems	26	20	4	0	1	0	11	1.63	62
Word processing	18	17	12	6	1	0	14	2.17	68
Spreadsheets	4	10	22	16	7	14	2	3.74	75
Presentation packages	16	22	7	9	2	0	13	2.27	69
Databases	5	16	23	11	3	2	9	2.95	69
Drawing packages	15	0	1	0	0	0	39	1.13	55
email	25	5	0	0	0	0	27	1.17	57
Social media	22	12	1	0	0	0	23	1.40	58
Internet search	26	12	3	0	0	0	20	1.44	61
Wikis	22	3	0	0	0	0	31	1.12	56
Collaboration tools	18	12	3	0	1	0	22	1.65	56
Hardware concepts	20	18	6	3	0	0	14	1.83	61
Software concepts	19	22	8	1	1	0	12	1.88	63
Computer ethics	20	20	5	0	0	0	14	1.67	59
Others	4	5	6	4	1	1	18	2.81	39
Other (please specify)									20
								answered question	**76**
								skipped question	**16**

Table 10. Specific programs and packages used in covering each topic.

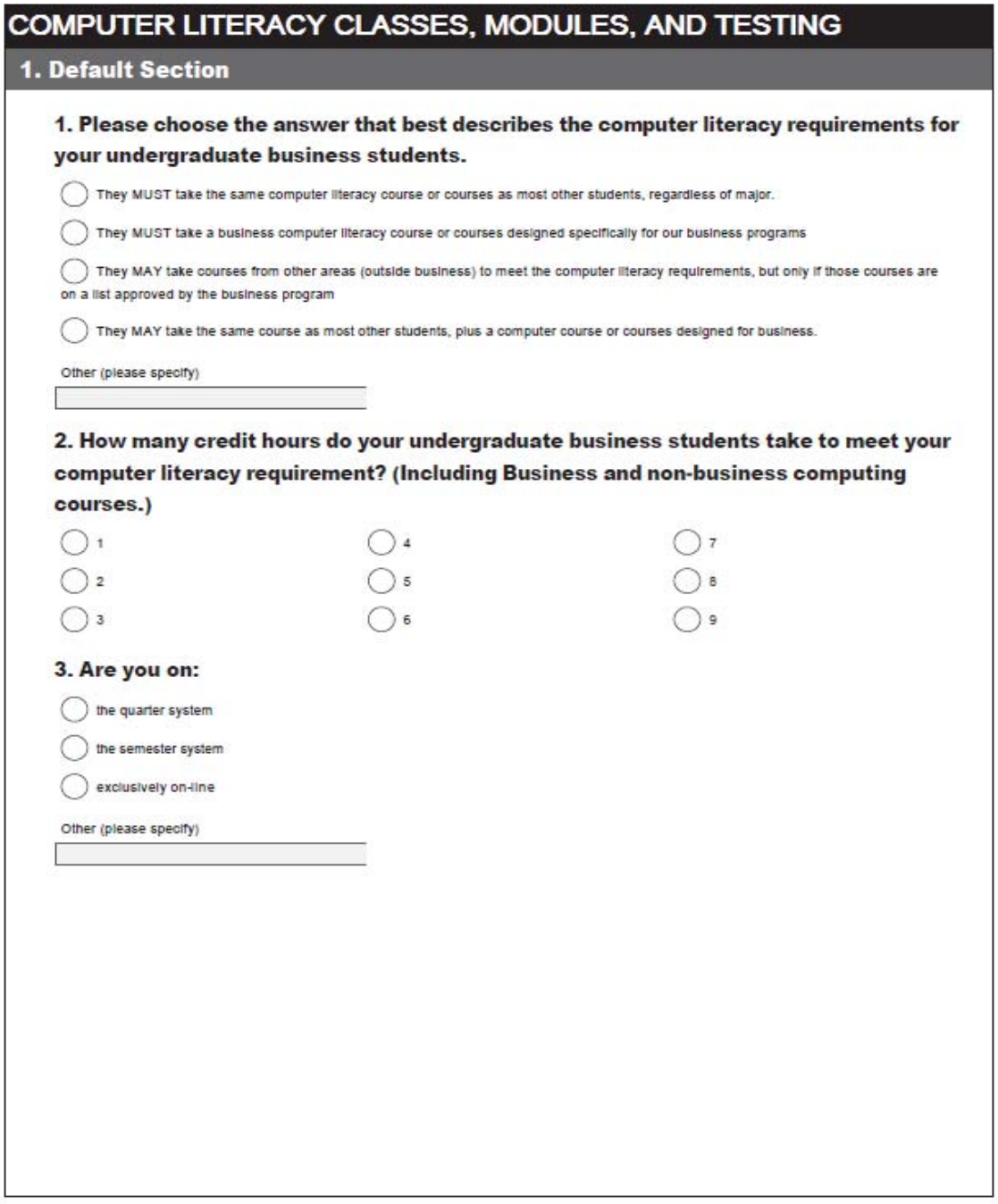
Which packages do you use when you cover each topic?

Answer Options	Software packages (Number of Respondents Using)
Operating systems	Windows 7 (49), Vista (15), XP(23), Mac OS(8), Unix (5), Linux (13), None (18)
Word processing	Word 2010 (42), Word 2007 (28), None (19)
Spreadsheets	Excel 2010 (55), Excel 2007(36), Excel for Mac 2008(2), None (1)
Presentation packages	PowerPoint 2010 (41), PowerPoint 2007 (29), PowerPoint for Mac 2008 (2), None (19)
Databases	Access 2010(43), Access 2007(30), FilePro (2), SQL Server(3), MySQL(2), None (15)
Drawing packages	Visio (3), Draw(1), None (62)
email	Gmail (9), Hotmail(1), Yahoo!Mail(1), Outlook(9), None (48)
Social media	Facebook (26), MySpace(6), Twitter(17), LinkedIn(17), None(46)
Internet search	Google (31), Yahoo!(5), Bing(12), Ask.com(3), About.com(2), Dogpile(3), None(38)
Wikis	MediaWiki(2), Wikispaces(3), Google Sites(3), None(59)
Collaboration tools	Google Docs(24), Sharepoint(6), Dropbox(5), None(43)

Table 11. Influences on Computer Literacy Courses

Please indicate your agreement or disagreement with the following statements						
Questionnaire Items	**Strongly Agree**	**Agree**	**Not sure**	**Disagree**	**Strongly Disagree**	**Rating Average**
Students with work experience have better computer skills than students without work experience.	13	34	19	8	0	2.30
Traditional age students (23 years old or younger) have better computer skills than non-traditional (24 and older) students.	4	22	24	19	5	2.99
Most of our students enter our program with better computer skills now than five years ago.	19	25	11	14	4	2.44
Changes in student skills have driven changes in our computer literacy courses in the last five years.	21	25	14	13	1	2.30
Changes in technology have driven changes in our computer literacy courses in the last five years.	26	35	4	9	0	1.95
The skill sets needed for computer literacy have changed dramatically in the last five years.	11	32	11	17	3	2.58
Our computer literacy courses have changed dramatically in the last five years.	15	28	8	19	3	2.55
We do not have enough time in our courses to cover everything needed for computer literacy.	15	36	8	13	1	2.30
Our budget limits what we can teach in our computer literacy courses.	9	15	14	29	6	3.11
We will require more courses for computer literacy in the future than we require now.	4	5	19	34	12	3.61
State law limits what we can do in computer literacy.	2	1	19	23	29	4.03
Accreditation limits what we can do in computer literacy.	1	6	13	33	19	3.88

APPENDIX B: SURVEY INSTRUMENT



COMPUTER LITERACY CLASSES, MODULES, AND TESTING

1. Default Section

1. Please choose the answer that best describes the computer literacy requirements for your undergraduate business students.

- ◯ They MUST take the same computer literacy course or courses as most other students, regardless of major.
- ◯ They MUST take a business computer literacy course or courses designed specifically for our business programs
- ◯ They MAY take courses from other areas (outside business) to meet the computer literacy requirements, but only if those courses are on a list approved by the business program
- ◯ They MAY take the same course as most other students, plus a computer course or courses designed for business.

Other (please specify)

2. How many credit hours do your undergraduate business students take to meet your computer literacy requirement? (Including Business and non-business computing courses.)

◯ 1	◯ 4	◯ 7
◯ 2	◯ 5	◯ 8
◯ 3	◯ 6	◯ 9

3. Are you on:

- ◯ the quarter system
- ◯ the semester system
- ◯ exclusively on-line

Other (please specify)

Page 1

COMPUTER LITERACY CLASSES, MODULES, AND TESTING

2. Testing out of computer literacy courses

This section is about testing out of computer literacy courses. If your students are not allowed to test out of computer literacy courses, checking the appropriate box should automatically take you to the next section of the survey questionnaire. If they are allowed to test out of computer literacy courses, please answer the other questions in this section.

1. Please check the box beside the choice that best describes your computer literacy program.

◯ Our business undergraduate students may test out of all our computer literacy courses.

◯ Our business undergraduate students are not allowed to test out of computer literacy courses.

◯ Our business undergraduates students may test out of some of their computer literacy courses.

Page 2

COMPUTER LITERACY CLASSES, MODULES, AND TESTING

3.

1. What percentage of your undergraduate business students TRY to test out of computer literacy courses?

- ◯ 0-10%
- ◯ 11-20%
- ◯ 21-30%
- ◯ 31-40%
- ◯ 41-50%
- ◯ >50%

2. Of the students who try to test out of the computer literacy courses, what percentage pass the test?

- ◯ 0-25%
- ◯ 26-50%
- ◯ 51-75%
- ◯ >75%

3. To test out of a computer literacy course, what score must students make on the test?

- ◯ 50%+
- ◯ 60%+
- ◯ 70%+
- ◯ 80%+
- ◯ 90%+

4. How many times may a student attempt to test out of a class?

- ◯ only 1
- ◯ 2
- ◯ 3
- ◯ no limit

Page 3

COMPUTER LITERACY CLASSES, MODULES, AND TESTING

4. Computer Literacy Coverage

Please let us know which areas you cover and what percentage of coursework is dedicated to each area. For example, if your students take one three hour course for computer literacy, then show what percentage of that course is devoted to each area. If your students take more than one course, what percentage of the total computer literacy program (i.e. percentage of all courses) is devoted to each area.

1. Please show which areas of computer literacy you cover and the percentage of class time devoted to each area.

	1-5%	6-10%	11-20%	21-35%	36-50%	>50%	N/A
Operating systems	◯	◯	◯	◯	◯	◯	◯
Word processing	◯	◯	◯	◯	◯	◯	◯
Spreadsheets	◯	◯	◯	◯	◯	◯	◯
Presentation packages	◯	◯	◯	◯	◯	◯	◯
Databases	◯	◯	◯	◯	◯	◯	◯
Drawing packages	◯	◯	◯	◯	◯	◯	◯
email	◯	◯	◯	◯	◯	◯	◯
Social media	◯	◯	◯	◯	◯	◯	◯
Internet search	◯	◯	◯	◯	◯	◯	◯
Wikis	◯	◯	◯	◯	◯	◯	◯
Collaboration tools	◯	◯	◯	◯	◯	◯	◯
Hardware concepts	◯	◯	◯	◯	◯	◯	◯
Software concepts	◯	◯	◯	◯	◯	◯	◯
Computer ethics	◯	◯	◯	◯	◯	◯	◯
Others	◯	◯	◯	◯	◯	◯	◯

Other (please specify) _____

2. Which operating systems do you cover in your computer literacy courses? Please check all that apply.

☐ Windows 7 ☐ Linux ☐ None

☐ Windows Vista ☐ Unix

☐ Windows XP ☐ Mac OS X

Other (please specify)

Page 4

COMPUTER LITERACY CLASSES, MODULES, AND TESTING

3. Which word processing programs do you cover in your computer literacy courses? Please check all that apply.

- ☐ Word 2010
- ☐ Word 2003
- ☐ Writer (Open Office)
- ☐ Word 2008 for Mac
- ☐ WordPerfect
- ☐ None
- ☐ Word 2007
- ☐ Pages for Mac

Other (please specify)

4. Which spread sheet packages do you cover in your computer literacy courses? Please check all that apply.

- ☐ Excel 2010
- ☐ Excel 2003
- ☐ Calc (Open Office)
- ☐ Excel 2008 for Mac
- ☐ Quattro Pro
- ☐ None
- ☐ Excel 2007
- ☐ Numbers for Mac

Other (please specify)

5. Which presentation packages do you cover in your computer literacy courses? Please check all that apply.

- ☐ PowerPoint 2010
- ☐ PowerPoint 2003
- ☐ Impress (OpenOffice)
- ☐ PowerPoint 2008 for Mac
- ☐ Presentations (WordPerfect)
- ☐ None
- ☐ PowerPoint 2007
- ☐ Keynote for Mac

Other (please specify)

6. Which database packages do you cover in your computer literacy courses? Please check all that apply.

- ☐ Access 2010
- ☐ FilePro
- ☐ Base (OpenOffice)
- ☐ Access 2007
- ☐ SQL Server
- ☐ None
- ☐ Access 2003
- ☐ MySQL

Other (please specify)

Page 5

COMPUTER LITERACY CLASSES, MODULES, AND TESTING

7. Which email packages do you cover in your computer literacy courses? Please check all that apply.

- ☐ Gmail
- ☐ Yahoo! Mail
- ☐ Mail for Mac
- ☐ Hotmail
- ☐ Thunderbird (Firefox)
- ☐ None

Other (please specify)

8. Which social networks do you cover in your computer literacy courses? Please check all that apply.

- ☐ Facebook
- ☐ Twitter
- ☐ None
- ☐ MySpace
- ☐ LinkedIn

Other (please specify)

9. Which drawing packages do you cover in your computer literacy courses? Please check all that apply.

- ☐ Visio
- ☐ Scribus
- ☐ Draw(OpenOffice)
- ☐ CorelDraw
- ☐ OmniGraffle
- ☐ None

Other (please specify)

10. Which Internet search packages do you cover in your computer literacy courses? Please check all that apply.

- ☐ Google
- ☐ Ask.com
- ☐ None
- ☐ Yahoo!
- ☐ About.com
- ☐ Bing
- ☐ Dogpile

Other (please specify)

11. Which wiki packages do you cover in your computer literacy courses? Please check all that apply.

- ☐ MediaWiki
- ☐ Wikispaces
- ☐ None
- ☐ Wetpaint
- ☐ Google Sites

Other (please specify)

Page 6

COMPUTER LITERACY CLASSES, MODULES, AND TESTING

12. Which collaboration packages do you cover in your computer literacy courses? Please check all that apply.

- ☐ Google Docs
- ☐ MS Sharepoint
- ☐ Dropbox
- ☐ MS Groove
- ☐ Zoho
- ☐ None

Other (please specify) _____

13. Please rank the top three areas computer literacy that need more coverage in your program.

	1	2	3
Operating systems	◯	◯	◯
Word processing	◯	◯	◯
Spreadsheets	◯	◯	◯
Presentation packages	◯	◯	◯
Databases	◯	◯	◯
Drawing packages	◯	◯	◯
email	◯	◯	◯
Social media	◯	◯	◯
Internet search	◯	◯	◯
Wikis	◯	◯	◯
Collaboration tools	◯	◯	◯
Hardware concepts	◯	◯	◯
Software concepts	◯	◯	◯
Computer ethics	◯	◯	◯

Other (please specify) _____

Page 7

COMPUTER LITERACY CLASSES, MODULES, AND TESTING

5. Influences and Change in Computer Literacy

The items on this page address the changes in computer literacy and computer literacy courses over the last five years.

1. Please indicate your agreement or disagreement with the following statements

	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Students with work experience have better computer skills than students without work experience.	◯	◯	◯	◯	◯
Traditional age students (23 years old or younger) have better computer skills than non-traditional (24 and older) students.	◯	◯	◯	◯	◯
Most of our students enter our program with better computer skills now than five years ago.	◯	◯	◯	◯	◯
Changes in student skills have driven changes in our computer literacy courses in the last five years.	◯	◯	◯	◯	◯
Changes in technology have driven changes in our computer literacy courses in the last five years.	◯	◯	◯	◯	◯
The skill sets needed for computer literacy have changed dramatically in the last five years.	◯	◯	◯	◯	◯
Our computer literacy courses have changed dramatically in the last five years.	◯	◯	◯	◯	◯
We do not have enough time in our courses to cover everything needed for computer literacy.	◯	◯	◯	◯	◯
Our budget limits what we can teach in our computer literacy courses.	◯	◯	◯	◯	◯
We will require more courses for computer literacy in the future than we require now.	◯	◯	◯	◯	◯
State law limits what we can do in computer literacy.	◯	◯	◯	◯	◯
Accreditation limits what we can do in computer literacy.	◯	◯	◯	◯	◯

Page 8

COMPUTER LITERACY CLASSES, MODULES, AND TESTING

6. Demographics and Background

This section is meant to help us understand more about your institution and your personal background.

1. How many undergraduate business students do you have at your institution?

- ◯ <100
- ◯ 101-200
- ◯ 201-300
- ◯ 301-400
- ◯ 401-500
- ◯ 501-750
- ◯ 751-1000
- ◯ >1000

2. What is the total enrollment at your institution?

- ◯ <500
- ◯ 501-1000
- ◯ 1001-2000
- ◯ 2001-3000
- ◯ 3001-5000
- ◯ 5001-7500
- ◯ 7501-10,000
- ◯ 10,001-15,000
- ◯ >15,000

3. What is your academic position?

- ◯ Academic Staff
- ◯ Instructor
- ◯ Assistant Professor
- ◯ Associate Professor
- ◯ Full Professor
- ◯ Adjunct

Other (please specify)

4. How old are you?

- ◯ <25
- ◯ 26-35
- ◯ 36-45
- ◯ 46-55
- ◯ >55

5. What is your highest degree?

- ◯ Undergraduate Degree
- ◯ Master's Degree
- ◯ Doctoral Degree

Other (please specify)

Page 9

COMPUTER LITERACY CLASSES, MODULES, AND TESTING

6. My highest degree is in:

- ◯ Computer Science
- ◯ Accounting
- ◯ Engineering
- ◯ Management Information Systems
- ◯ Quantitative Methods
- ◯ Education

Other (please specify)

7. As a faculty member, are you considered professional qualified (PQ), academically qualified (AQ), or neither:

- ◯ AQ
- ◯ PQ
- ◯ Neither AQ nor PQ

Other (please specify)

8. Are you:

- ◯ tenure-track
- ◯ tenured
- ◯ non-tenure track

Other (please specify)

9. How long have you been at your school?

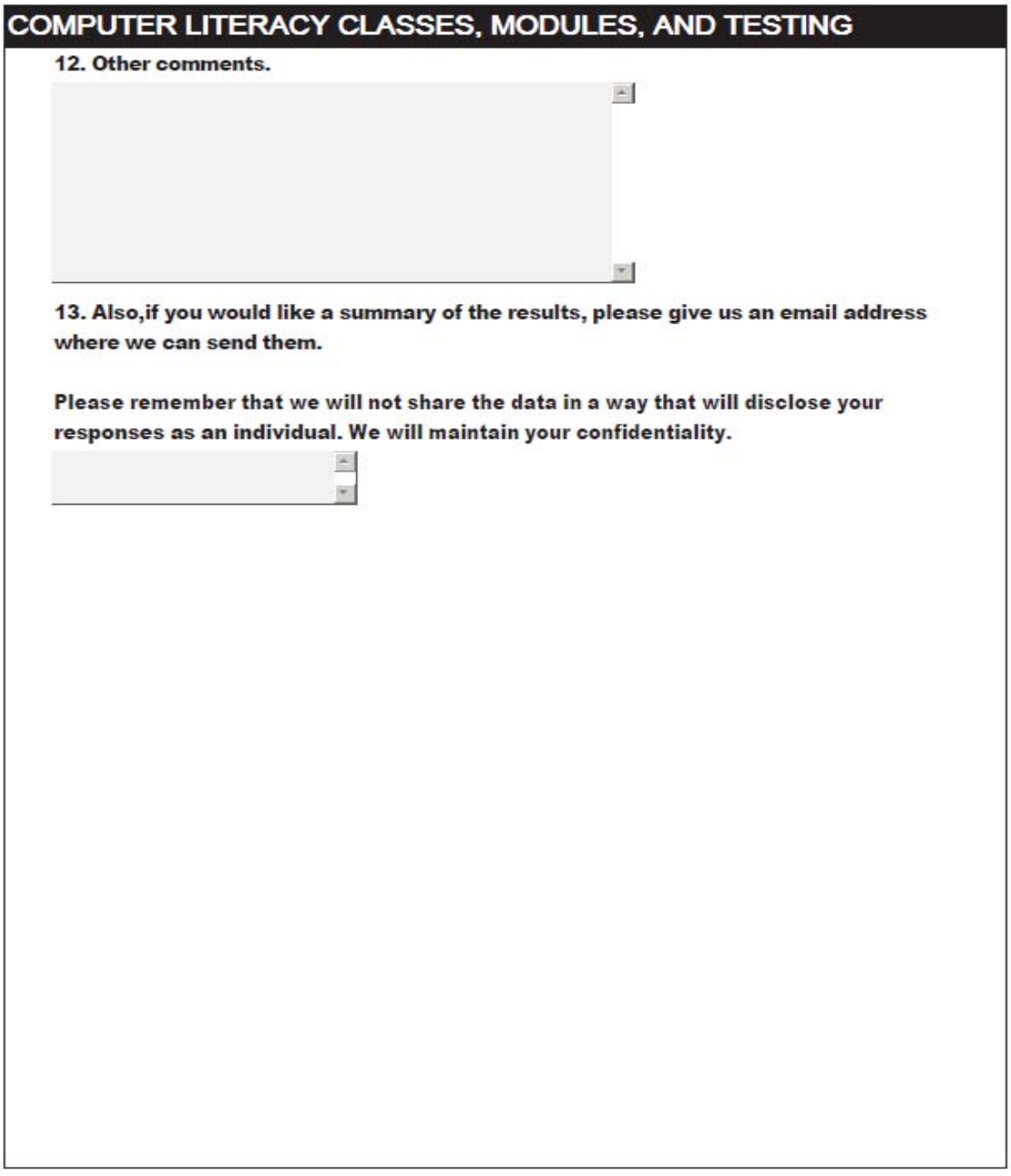
- ◯ <3 years
- ◯ 6-10 years
- ◯ 3-5 years
- ◯ >10 years

10. What is your gender?

- ◯ Male
- ◯ Female

11. What questions should we have asked about your computer literacy program, and what are your answers to those questions?

Page 10


COMPUTER LITERACY CLASSES, MODULES, AND TESTING
12. Other comments.
13. Also,if you would like a summary of the results, please give us an email address where we can send them.
Please remember that we will not share the data in a way that will disclose your responses as an individual. We will maintain your confidentiality.
Page 11