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LEARNER-CENTERED ASSIGNMENTS IN COMPUTER LITERACY*

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ABSTRACT

Literacy is a concept that is understood to be the identifier of an educated populace. In today's world, literacy includes computer literacy, as well as language and quantitative literacy. This paper describes exercises developed to improve first year students' computer literacy through more learner-centered engagement. Exercises are designed to support learner-centered goals of independent and responsible learners, appropriate breadth and depth of content, teacher as facilitator, and assessment woven into learning. Exercise topics include purchase of a personal computer, basic logic via spreadsheets, an annotated bibliography built with electronic resources, and an integrated assignment customized by and for each student.

INTRODUCTION

Literacy is a concept that is understood to be the identifier of an educated populace. It is most often defined in the areas of written communications and quantitative skills. In today's world, however, technological competence has risen to the same level of importance. However, while most students have exposure to computers and experience using the Internet, a gap is emerging between functional and analytical uses of computing technologies. Students may be able to use a word processor and surf the Internet, but they

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often do not understand the fundamentals of how and why these technologies work. Given the importance of computer technologies as a fundamental driver for societal and economic change, universities are again pondering what defines computer literacy and what specific skills graduates must obtain in order to be considered proficient in computing technologies.

There exists a need for expanding and redefining what it means to be computer literate. Computer literacy traditionally has been associated with the ability to use computers to perform a variety of application-based tasks, but that definition is no longer adequate. Computer literacy also includes the ability to use the computer as a means of communication and as a source of information (Hoffman, Blake, McKeon, Leone, and Schorr, 2005). Cesarini (2005) equates computer literacy with information-technology literacy that he describes as a combination of several literacies or a 'meta-literacy.' This literacy is built upon teaching students to think critically about technology and to use and manage various hardware devices, software applications and online resources.

In order to achieve this expanded view of literacy, a shift towards a learner-centered definition of computer literacy must occur. The goal is away from silo teaching of machine concepts or application software use but instead applying computer and Internet technologies to solve problems. Most faculty members want students to complete degrees armed with more than facts. Rather, the goal is to learn how to learn. Computer literacy, even more than language or mathematical literacy, in the 21st century demands an independent, curious learner.

In her book *Learner-Centered Teaching*, Weimer (2002) defines learner-centered curriculum appropriate to many disciplines in a university environment, even those in the hard sciences. She identifies the changes that educators must be willing to make in order to produce these independent, curious learners:

1. Balance of power: Design learning activities that give students appropriate decision-making authority over their own learning.
2. Function of content: More content coverage is not equivalent to more learning from students.
3. Role of the teacher: Teachers need not be the sole expert in the learning environment.
4. Responsibility for learning: Students must be taught how to become independent, autonomous learners.
5. Purposes and processes of evaluation: Assessments are not used merely to measure learning; rather they are an integral part of the learning process.

Kennesaw State University offers a lower division elective course titled "Computers and Your World." Students with declared majors outside of technology are the intended audience. The goal is to demonstrate how technology will support their various majors and professional aspirations. Because there is no prerequisite, the course attracts novice students as well as those looking for an easy "A." To incorporate the expanded view of computer literacy, the course is organized around a framework composed of the following modules:

1. Hardware and operating systems

2. Application software
3. Internet resources and information fluency

The following sections describe exercises designed to change the teaching, and therefore learning, that occurs in an introductory computer literacy course. An exercise is provided for each of the three modules outlined above. The final exercise integrates the characteristics of a learner-centered model.

3. EXERCISES

3.1 Becoming an Informed Buyer of Computer Technology

This lesson involves a demonstration in which students take an actual hands-on tour of a computer as it is disassembled piece by piece. Each component is examined and discussed regarding its function, its interaction with the entire machine, its capabilities, and what requirements or constraints might accompany it. Basic operating system and application software are discussed with emphasis on how they interact with the hardware and the demands they might make on components such as memory and storage devices.

Following this hands-on exercise, students are assigned an exercise simulating an informed purchase of a personal computer. The assignment, “Buy Your Own Personal Computer” (BYOPC), includes a budget as well as a list of minimum requirements, desirable components and capabilities. The student must configure and purchase a new personal computer, finding the best buy for the budget allocated. Students are steered toward the websites of several PC vendors that offer online configuration services. If students are unable to answer questions based on a vendor’s website, they are expected to call or visit a local vendor to further research their options.

This exercise supports the hardware and operating systems module of the framework for the course. It also supports goals 2 and 4 of Weimer’s (2002) approach to learner-centered teaching. That is, the content is appropriate for a first year course in computer literacy and encourages students to be more independent and curious.

3.2 Scores and Course Grade Spreadsheet Exercise

Toward the end of the term, many teachers hear the question, “What score do I need on the final to get an ‘A’ in the class?” Teachers track individual grades so often that they forget that many students do not monitor their own progress with enough granularity to be able to answer that question. The *Scores and Course Grade Spreadsheet* assignment enables students to track their progress throughout the term in “Computers and Your World.” Moreover, the assignment creates an opportunity to shift the balance of power, as espoused by Weimer (2002), by encouraging students to be reflective about their performance in quizzes, assignments and other evaluative components.

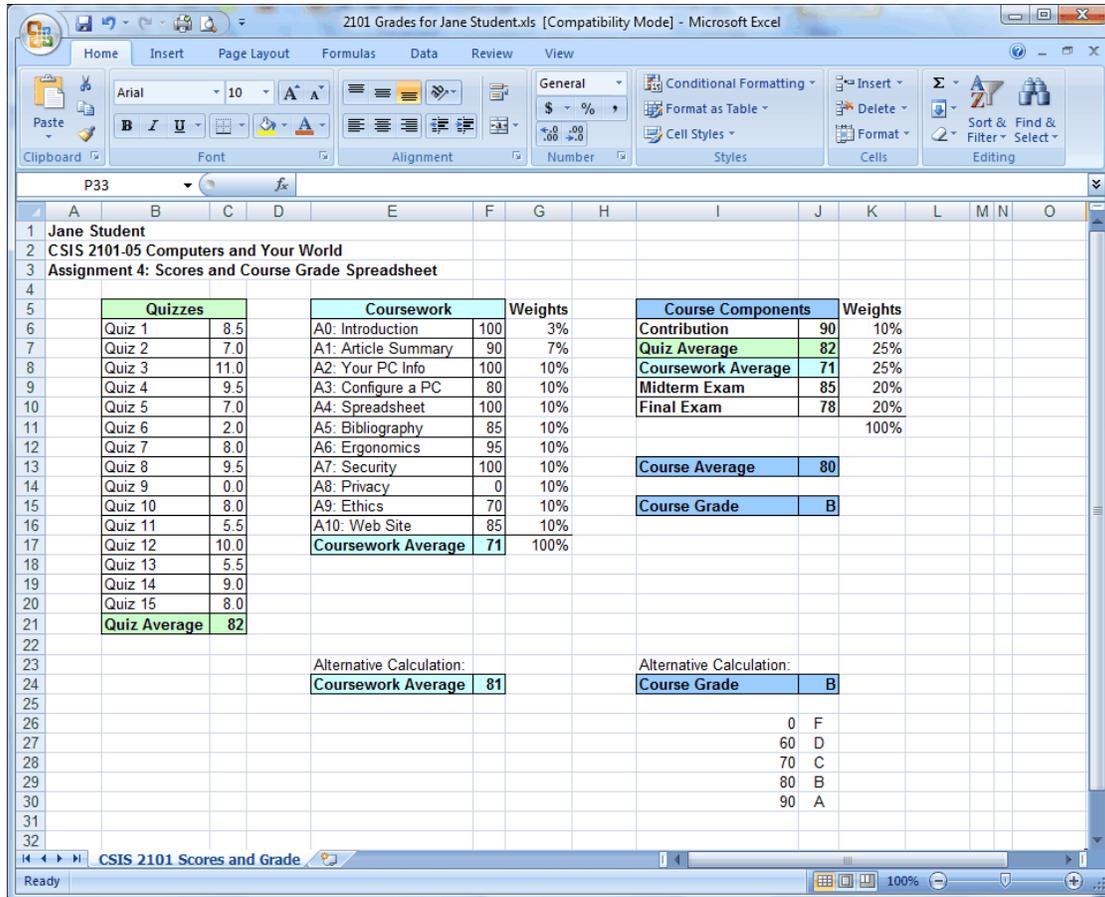


Figure 1: Sample for Scores and Course Grade Spreadsheet Assignment

Figure 1 displays the spreadsheet that students are shown as a sample for the assignment. Course components on which students are evaluated include contribution, quizzes, coursework (homework and in-class activities), a midterm examination and a final examination. The quiz average requires a complex function that drops the lowest two grades. The coursework average and course average are weighted averages.

Students are instructed to compute the coursework average in two ways: using an equation and using the SUMPRODUCT function. Similarly, alternative methods are used to assign the course letter grade: a nested IF statement and the VLOOKUP function. The nested IF statement, with which some students have particular difficulty, is a practical way to introduce the notion of algorithms and conditional structure.

This exercise supports the application software component of the computer literacy framework. The exercise has explicit as well as implicit objectives. Increased proficiency with a popular spreadsheet application is the obvious explicit objective of the assignment, which meets the content goal described by Weimer (2002). Implicit objectives include learning about algorithms, conditional structures and what-if analysis. The shift in responsibility for monitoring progress mentioned above is another implicit aim of the spreadsheet assignment.

3.3 Annotated Bibliography

As access to the Internet has grown, information has proliferated. With the evolution of easy-to-use technologies, anyone with access to the Web can create content and disseminate it quickly. Gone are the days of controlled publication channels and information scrutiny by editorial review boards. Google and other search engines have made it trivial to find information and some college students have come to rely on Wikipedia as an authoritative source. What is missing, however, is critical analysis of the retrieved information.

In this exercise, students are introduced to the topic of information literacy and identification of valid sources of information. Students are directed to complete the online tutorial on information literacy (TILT) created at the University of Texas at Austin and sponsored by the University of Texas Digital Library (2004). Students are introduced to electronic library resources that include a collection of online bibliographic databases and Google Scholar.

The deliverable for this assignment is an annotated bibliography. Students are asked to pick a specific research topic related to computer technology. After choosing a topic, students select one concept from which to form a research question to investigate. For instance, a student might choose the topic of information security, about which they construct a research question such as, “What are some of the best practices for securing a home computer?” Using the research question, students are required to complete an annotated bibliography that cites six references made up of Internet sources such as websites, at least one periodical or journal article and at least one peer-reviewed source. The annotated bibliography consists of an introduction, summarization of each source and a conclusion. In addition, students are required to assess the validity of each source. The assignment is critiqued based on how well each summary is related to the research question and how well the validity of each source is defended or disputed.

This exercise supports the Internet and information fluency component of the computer literacy framework. With respect to the goals for learner-centered teaching, it supports the role of the teacher, as well as the function of content. Students are taught to critique electronic information, especially as it relates to undergraduate research activities. They also gain research practice without completing a formal research paper. This content is appropriate for first year college students.

3.4 Meta-learning assignment

Toward the end of the term, students are required to complete a two-part assignment – an integrated “designer assignment.” In part 1, they must design an assignment for themselves. In part 2, they must implement their “designer assignment.” For part 1, students are given specific requirements and suggestions in order to guide them in developing their own assignment, customized to their interests and current skill level. Students are initially confused by the idea that they are to create their own assignment. Some students resist this idea, claiming that it is the teacher’s job to create the assignments. Others immediately become enthusiastic and consider it to be the best assignment in the class. The teacher’s role at this point is to offer guidance and more specific suggestions such as online tutorials and other sources of new IT knowledge. Part

1 involves several iterations for some students, primarily those students who are either resistant to the idea or not ready to challenge themselves with independent learning.

Part 2 is more comfortable for students. Specifications for this assignment are brief: “Your submission for A7 depends on your APPROVED version of A6. Be sure to read the ‘comments’ when you look at your grade for A6. This describes any changes that should be made to your plan.”

Once the specifications for the assignment are approved in part 1, many students are ready to complete the assignment on their own. Some students, however, may have been too optimistic in their plans for this assignment. These students require additional support from the instructor as they iteratively re-design aspects of the assignment.

This exercise allows students to specialize in one of the modules for computer literacy or to integrate skills introduced earlier in the semester. Such an assignment is intended to address the first four goals of learner-centered education:

- Balance of power: This assignment stretches students to determine what and how to learn.
- Function of content: Students in a first year computer literacy class may be very different from one another in terms of their current skills, as well as future goals. This assignment is customized to each student’s particular needs with respect to content.
- Role of the teacher: The teacher does not relinquish *all* power to the student, but some students are uncomfortable with this level of control. A student creates a plan in part 1. This plan must be approved (graded) before the student may begin part 2.
- Responsibility for learning: The assignment requires that the student identify some source(s) of knowledge for part 2. That is, they may find online tutorials, or they may sign up for free classes at our university, or they may identify a friend who is willing to teach them.

CONCLUDING REMARKS

The definition of computer literacy has evolved and expanded beyond just the ability to utilize computers to perform application-based tasks. The basic framework now includes the need for familiarity with hardware and operating systems as well as recognition of the computer as both a communications tool and a primary source of information.

Traditional students of the 21st century begin their academic pursuit with a rudimentary knowledge of basic application software, a strong sense of the role computers play in *social* communications, and a firm grasp of the computer as a source of trivial information. However, their base of knowledge seldom extends to other areas of the expanded literacy framework – the ability to understand hardware constraints and capacities, operating systems, the extended communication capabilities provided by computers and computer networks, an appreciation of the depth of the Internet as a resource for academic and scientific information, and a high degree of information fluency.

The computer literacy framework provides an ideal platform for the development of independent learners. The exercises described in this paper are intended not only to address computer literacy needs of the 21st century, but also to provide techniques that promote learner-centered education. A final goal of these exercises is to lead first year students on their path to the future, a future in which they are effective life-long learners, empowered to determine their own approach to learning.

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