

4-17-2012

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Recommended Citation

Weiner, S., Pelaez, N., Chang, K., & Weiner, J. (2012). Biology and Nursing Students' Perceptions of a Web-based Information Literacy Tutorial. *Communications in Information Literacy*, 5 (2), 187-201. <https://doi.org/10.15760/comminfolit.2012.5.2.112>

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BIOLOGY AND NURSING STUDENTS' PERCEPTIONS OF A WEB-BASED INFORMATION LITERACY TUTORIAL

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ABSTRACT

This study examined the perceptions of two groups of students to obtain different perspectives on the online information literacy tutorial, [CORE \(Comprehensive Online Research Education\)](#), to plan for its update. The CORE tutorial includes seven modules: "Planning Your Project," "Topic Exploration," "Types of Information," "Search Tools," "Search Strategies," "Evaluating Sources," and "Copyright, Plagiarism, and Citing Sources." First-year students in biology and nursing courses responded to a survey after completing the CORE modules. Students indicated that they liked learning through an online tutorial. However, they thought that the tutorial could be improved with shorter modules and the addition of video and audio content. Few students reported learning important information from the "Copyright, Plagiarism, and Citing Sources," "Evaluating Resources," and "Types of Information" modules. They suggested topics for additional tutorials: how to use library databases and Microsoft Excel; how to evaluate the quality of information, how to cite references, and how to find statistics.

INTRODUCTION

College and university students, undergraduate, graduate, and post-graduate, are adult learners whose learning preferences generally are self-directness; experiential (discussion, problem-solving); application to real life; and competency-based (Brookfield, 1986). These attributes influence their acceptance of instructional materials and methods. Online tutorials are asynchronous methods of delivering individualized instruction that have flexibility in the pace of learning, its structure and method, and the material to be learned (Betrus, 2002). Students can work through tutorials in their chosen location at their own convenience to accomplish additional instruction within a course but outside of scheduled class time. There are some indications that online instruction in basic library skills may be as effective as in-person instruction (Zhang, 2007).

Two possible ways to evaluate web-based tutorials are to measure student learning (Oakleaf, 2009; Tronstad, Phillips, Garcia, & Harlow, 2009; Noe, 2005) and to study how effectively students use and navigate through them (Lindsay, Cummings, Johnson, & Scales, 2006). A 2009 study examined 180 tutorials produced by academic libraries using 30 quality indicators and concluded that “much work remains to be done before the web-based tutorials created by academic libraries reach a mature stage of development” (Somoza-Fernández & Abadal, 2009). Many tutorials did not incorporate active learning, although other studies indicate that active learning is preferable (Anderson, Wilson, Livingston, & LoCicero, 2008; Hrycaj, 2005). A learning outcomes study randomized students into three groups: those who used a tutorial; those who used a tutorial with the guidance of a librarian; and those who

attended in-person instruction by a librarian. The group that attended an in-person instructional session showed the most improvement between pre- and post-test scores (Churkovich & Oughtred, 2002).

Appelt and Pendell (2010) conducted focus groups of faculty to learn their perceptions of tutorials developed for students in the health sciences. They found that there were differences in opinions on the ease of use, navigation, and aesthetics of the tutorial based on whether the respondent was from nursing, medicine, or dentistry. Respondents suggested replacing “library jargon” with terminology used in the subject disciplines. They suggested simplifying a flowchart that described the publication cycle. Some respondent groups indicated that the tutorial may have placed more emphasis on quantitative research over qualitative in a hierarchy of preferred methodologies. Some faculty discouraged students from using Google and did not think it should be included in the tutorial as a resource. Respondents thought that a glossary of terms would be a useful addition.

Students, as the intended user group, should be involved in the development of information literacy tutorials (Sullivan, 2004). This can occur by involving students in the assessment of the effectiveness of tutorials. Before 2005, there was little published on usability and online information literacy instruction (Bury & Oud, 2005; Sullivan, 2004). Since then, Bury and Oud (2005) conducted usability testing to evaluate user experiences and preferences in preparation for updating a tutorial. They asked four students to log their impressions of the navigation/usability and tutorial content. Bowles-Terry, Hensley, and Hinchliffe (2010) reported that they developed best practices for video tutorials through interviews with 15 students. Mages

and Garson (2010) conducted a mixed methods assessment of a tutorial on how to cite references using the American Psychological Association (APA) format. Johnston (2010, p. 217) evaluated an information literacy tutorial for first-year social work students because “development and maintaining an online information tutorial requires a large commitment from the librarian.”

It is possible that students' preferences in relation to online information literacy instruction may differ by program of study. In planning an information literacy initiative, “the cultural differences between institutions, disciplines, and professional communities must all be taken into account” (Walter, 2007, p. 62).

There are approximately 40,000 students at Purdue University. To provide a resource that ensured that all undergraduate students could learn basic concepts about information literacy online, the Purdue University Libraries developed an online tutorial entitled CORE (Comprehensive Online Research Education) in 1997. CORE consists of seven modules: “Planning Your Project,” “Topic Exploration,” “Types of Information,” “Search Tools,” “Search Strategies,” “Evaluating Sources,” and “Copyright, Plagiarism, and Citing Sources.” From 2005 to 2009, the tutorial received over 6,000 hits. Sullivan (2004) described the Purdue University Libraries tutorial, CORE, as providing:

an exemplary overview of the research process with some special features. The developers have done an excellent job of providing an overview of the objectives, not just at the beginning of the tutorial but also in each of the subsections. The graphics and the layout of the

navigation panels are concise and easily understood. In addition to quizzes that allow users to assess their knowledge of concepts, the tutorial has a live on-line practice session that does an excellent job of prompting the user through the split-screen scenario without losing or confusing them. One of the more impressive features in this tutorial is the module called “Plan Your Project.” The developers explain in detail how students should divide their time when approaching a term paper project... the tutorial also provides a project planner module in which the student can enter a start date and a due date, and the module will then create a detailed project timeline. Because many freshmen have difficulty with time management, this is an especially important feature (Sullivan, 2004, p. 82-83).

Such modules that can function either independently or in a linear manner allow for optimal flexibility in online information literacy learning (Sullivan, 2004). Sullivan's assessment of the CORE tutorial reflected the instructor's or expert's view of the instruction. However, adult learning theory stresses the active involvement of the student in the learning process. To accomplish this type of assessment, the student should be encouraged to critique the instruction. The designers should pay careful attention to such information as they develop replacement modules.

The usage of the CORE tutorial provided justification for the libraries to plan for substantial changes to the CORE modules to incorporate assessment, active learning, and newer technologies more fully. The purpose of this project was to assess student

experiences and perceptions about using CORE and to solicit suggestions from them for improvements. The opportunity to gain students' evaluations of the CORE tutorial occurred as the result of its use in two first-year undergraduate courses. A collaboration between professors of library science, biological sciences, and nursing was an example of the sharing of goals, tasks, and extensive planning and implementation that foster learning and advance knowledge (Raspa & Ward, 2000), and is a best practice for library tutorial development (Blummer & Kritskaya, 2009) This study reports on the perceptions of two groups of students, providing different perspectives on the present CORE tutorial to plan for its update.

METHODS

The authors collaboratively developed the online survey (see Appendix) based on information they wanted to learn from the students about the tutorial. Administering the survey to student groups in two majors with differing emphases on research would provide varied student perspectives to assist in revising the CORE tutorial.

The survey was separately administered to 309 first-year students in a first-year biology course and 60 students in a first-year nursing course at Purdue University in January 2010 after they completed the CORE tutorial. These groups were selected because the instructors required or encouraged the students to use the CORE tutorial as a self-directed learning activity. Information literacy is an integral part of the freshman-level Nursing Informatics course. Those students were required to complete all seven CORE modules. The students in this course earned 10% of their grade by completing the modules. In contrast, the biology students had the option of selecting

modules to complete. They did not receive credit for completing the modules. Biology students' grades were based on the number of "points" accumulated throughout the course. Fourteen percent of the points involved research, which was a small component of the overall coursework.

The survey consisted of multiple choice and open-ended questions. The first-year biology and first-year nursing students were asked to describe their experience with and perception of the CORE tutorial, to provide suggestions for a newer version, and to recommend other topics for the development of future tutorials.

RESULTS

Respondent Characteristics

Biology students self-selected the modules they completed according to personal interests and perceived learning needs. Nursing students were required to complete all modules as an assignment. Ninety-four percent (n=292) of the biology students in the class responded to the survey. Among these students, 56% (n=164) were female; 74% (n=215) were first-year students; 17% (n=50) were sophomores; and 9% (n=27) were juniors or seniors. Most of them indicated that their major was in the College of Science (77%, n=225), which is the home for the biology course involved. The biology students had various degree objectives: 50% (n=146), a biology degree; 15% (n=43), a pre-med program; 12% (n=35), a biochemistry degree; and 1% (n=4), an agriculture or wildlife biology degree.

Almost all of the nursing students (97%, n=58) completed all CORE modules. The nursing students were female (96%, n=48) and in their first year of the program (96%, n=48). All respondents indicated that their

major was in the College of Pharmacy, Nursing, and Health Sciences.

Table 1 shows the percentage of biology students who completed each of the individual CORE modules. The only modules that a majority of these students completed were the "Planning Your Project" (62%, n=182) and "Search Tools" (56%, n=164) modules. "Evaluating Sources" was the module that the smallest percentage of students completed (30%, n=89).

Self-Reported Learning

Students were asked several questions related to self-reported learning (see Appendix). Fifty-three percent of biology students (n=155) and 75% of nursing students (n=45) indicated that they liked the CORE tutorial because they learned information perceived to be important. Forty-three percent of biology students (n=126) and 21% (n=12) of nursing students did not know any of the information that was included in the CORE tutorial. Twenty-nine percent of biology students (n=86) and 17% (n=10) of nursing students indicated they already knew the subject matter that was in the CORE tutorial before completing it.

Seventy-six percent of biology students who indicated that they learned important information from the tutorial also indicated that they did not know any of the information prior to taking the tutorial (p=.020). Ninety-one percent (n=41) of nursing students who indicated that they learned important information from the tutorial also indicated that they did not know any of the information prior to taking the tutorial (p=.005).

The students were asked to identify the most important things they learned from the CORE tutorial. Nine percent (n=14) of

biology students and 7% (n=3) of nursing students considered the "Copyright, Plagiarism, and Citing Sources" module as an important source. Both groups of students indicated that they learned the least from the "Topic Exploration" module (1% of biology students; 2% of nursing students), while 8% and 10% of biology or nursing students, respectively, rated the "Evaluating Sources" module as an important source. Both student groups perceived the "Planning Your Projects" module differently, with 21% of biology students and 2% of nursing students indicating that it provided important information. The "Types of Information" module was considered important by 7% of biology students and 27% of nursing students.

There was a correlation between completing the "Copyright, Plagiarism, and Citing Sources" module and the biology students' indication that they learned about preventing plagiarism. All of the students who completed this module indicated that they learned about preventing plagiarism.

There was a statistically significant relationship between biology students who reported that they liked the CORE tutorial because they learned important information and their completion of four of the individual modules. Table 2 shows that more than half of the biology students who indicated they liked the CORE tutorial because they learned important information also completed the "Planning Your Project" (67%, n=104) or "Search Tools" (63%, n=97) modules.

Both nursing and biology students reported that they learned how to avoid plagiarism by taking the tutorial modules. The "Copyright" module specifically covers plagiarism. A predominance of nursing

TABLE 1 — PERCENTAGE OF BIOLOGY STUDENTS COMPLETING EACH MODULE

Module	Biology Students (n = 292)
Planning Your Project	62% (n=182)
Topic Exploration	43% (n=126)
Types of Information	37% (n=108)
Search Tools	56% (n=164)
Search Strategies	40% (n=117)
Evaluating Sources	30% (n=89)
Copyright, Plagiarism, and Citing Sources	42% (n=124)

students stated that they learned this subject matter through the modules. One hundred percent of the nursing students who completed the “Copyright, Plagiarism, and Citing Sources” module also indicated that they learned important information from the tutorial. Only 24% of nursing students knew the information about plagiarism prior to taking the tutorial. Biology students showed a different pattern with 41% reporting they knew about plagiarism before taking the CORE tutorial. Forty-two percent of biology students and 78% of nursing students learned about plagiarism by completing the “Copyright” module that specifically covers plagiarism.

Preference for Online

Fifty-six percent (n=87) of biology students who learned important information from the tutorial liked to work on it online ($p < 0.001$). There was no statistical difference in nursing students who learned important information and liked to work on the tutorial online.

Perception of Tutorial

Only around 20% of both groups thought the tutorial was the right length, although the majority of respondents liked working with it online. Most of the students thought the tutorial was too long. When asked what would make the tutorial better, students could check any of the options given, or they could add their own. Fifty-six percent (n=164) of the responses from biology students and 33% (n=19) of the responses from nursing students indicated a preference for video enhancements. Thirty-nine percent (n=114) of the responses from biology students and 41% (n=24) of the responses from nursing students indicated a preference for audio. A desire for access by cell phone was reported by 14% (n=41) of biology students and 10% (n=6) of nursing students. A desire for access by podcast was reported by 10% (n=29) of biology students and 5% (n=3) of nursing students.

Possible Topics for Other Tutorials

The students were asked what other research, library, or technology skills they would like to learn through a tutorial. Table

TABLE 2 — BIOLOGY STUDENTS WHO LEARNED IMPORTANT THINGS FROM INDIVIDUAL CORE MODULES

Module	Biology Students (n = 292)
Planning Your Project	67% (n=104)
Topic Exploration	49% (n=76)
Search Tools	63% (n=97)
Evaluating Sources	36% (n=55)

3 shows that biology students most wanted additional tutorials on how to find statistics for their courses (48%, n=139); how to evaluate the quality of information (43%, n=125); and how to cite references in a bibliography (43%, n=127). At least 40% of nursing students expressed a desire for additional tutorials on all of the topics except how to create PowerPoint presentations (16%, n=9).

DISCUSSION

This report described the findings in a survey of 292 biology and 58 nursing students concerning their experience with an online information literacy tutorial. The majority of nursing students who responded to the survey were first-year students and female. The biology students were more balanced in gender and came from a variety of science majors. Respondents from both groups reported that they liked having the ability to complete the tutorial online and indicated that they learned important information from it.

Importantly, this study included student groups from two different academic programs, each having different perceptions about the tutorial they used for an introduction to information literacy. Future

assessment of tutorials should include feedback from students who are potential users about their experiences, as seen from the framework of different programs with different assignments.

The students expressed an interest in having tutorials on evaluating the quality of information and citing references in a bibliography. Interestingly, few of them reported learning from the “Evaluating Sources” or “Copyright, Plagiarism, & Citing Sources” modules. The subject matter in these modules needs to be examined closely and revised for relevance to student needs. This disconnect is a cogent example of differences in attitudes and perceptions. While the content included in modules of this type may be relatively standard, the presentation formats may need to be drastically revised. This suggests that there is a need for a process of continuing development and student evaluation.

A recent study on information behaviors in undergraduate students (Head & Eisenberg, 2010) concluded that students have the most difficulty with defining a topic for their research; however, the students in this study found the “Topic Exploration” module the least informative of the modules. The content and format of this tutorial should be re-considered. Format is important to these

TABLE 3 — TOPIC PREFERENCES FOR ADDITIONAL TUTORIALS

Proposed Topic	Biology Students	Nursing Students
Library databases	32% (n=92)	45% (n=26)
Using Microsoft Excel	35% (n=102)	57% (n=33)
How to create PowerPoint presentations	8% (n=23)	16% (n=9)
How to evaluate the quality of information	43% (n=125)	50% (n=29)
How to cite references in a bibliography for my papers	43% (n=127)	53% (n=31)
How to find statistics for my courses	48% (n=139)	40% (n=23)

adult learners as evidenced by the numerous suggestions that the tutorial was too long and would be improved if it included video and audio content. These results confirmed those of other studies that evaluated online tutorials. Respondents in those studies reported that the tutorials were too long and too repetitive. The tutorials in those studies also had too much detail or were too basic. They were also too text-based or should have included pictures, video, or animation and they should have been interactive (Lindsay, Cummings, Johnson, & Scales, 2006; Bury & Oud, 2005).

The nursing students were required to complete all seven CORE modules. In contrast, the biology students primarily self-selected the “Planning Projects” and “Search Tools” modules. The differences in the students’ perceptions could be related to the amount of emphasis placed on research in the two courses included in the study. Nursing students were enrolled in an informatics course, whereas biology students were introduced to research as a small component of a first-year biology course.

Only about one-third of biology students completed the modules on information sources and evaluating sources. This selection process is consistent with the needs perceived by students beginning their college experience. Many students realize that they need to know more about search strategies. Of special concern is the low frequency of biology and nursing students who cited “Evaluating Sources” as a source of important information. The content of that tutorial should be re-evaluated; there may be a need for more explicit assignments to make students aware of the need to evaluate the quality of their sources. Students seek answers quickly and tend to rely on unfiltered sources such as Wikipedia and Google (Head & Eisenberg, 2010a; Lee, 2008). A module dealing with evaluating sources will need to convince students why it is important for them to find resources that provide accurate, useful, and reliable information.

Nursing students seemed to learn more from the modules than the biology students. Possible explanations could be that they were required to complete all of the modules, that the modules were more

relevant to their course assignments, or that they knew less about the information literacy topics presented in the modules. A characteristic that differed between biology and nursing students was the percentage reporting that they had prior knowledge of the subject matter of the individual modules. Seventy-six percent of biology students and 91% of nursing students reported that they did not know the information in the tutorials before completing them. Such self-report questions might be advantageous in developing appropriate modules that match the needs of the students in the future.

In the nursing course, students were involved in two group projects using online library databases. Students were expected to select at least two credible, reliable, and current research articles related to a group topic, and to discuss their articles during group presentations. That may explain why about 30% of nursing students perceived "Types of Information," "Search Tools," and "Search Strategies" modules as providing important information. Like the nursing students, biology students were asked to find and write about original research (Clase, Grundlach, & Pelaez, 2010). The difference is that the points they earned were mostly exam points for learning about research (experimental design) and very little credit was given for the process. Fewer biology students perceived a need for help with search strategies.

Nursing students were given three weeks to view the CORE modules. They might have viewed all seven CORE modules in a day, which could have led to the perception that the CORE modules were too long. To address this concern, the length of the tutorials should be considered. Other approaches would be to instruct students to view the CORE modules over different days or to integrate the assignment of specific

modules with the related class content or assignments.

Few students perceived that they learned important information from the "Copyright, Plagiarism, and Citing Sources," "Evaluating Resources," and "Types of Information" modules. Students desired future tutorials on evaluating the quality of information, how to cite references in a bibliography for their papers, and how to find statistics for their courses. This indicates that the "Copyright, Plagiarism, and Citing Sources," "Evaluating Resources," and "Types of Information" modules are not meeting student learning needs and should be improved. The current "Citing Sources" module presented information on MLA citation style because CORE was developed for a general undergraduate population and MLA is a generally accepted format. But these students were expected to use the APA citation format in their course. A new tutorial developed by the Harvard Graduate School of Education Library on using APA format for citation might be substituted or used as a model (Mages & Garson, 2010).

Few students preferred access to the tutorial by cell phone or podcast. This is an interesting finding, since a 2010 report indicated that mobile computing is one of the technologies likely to enter the mainstream of institutions within 1-2 years (Johnson, Levine, Smith, & Stone, 2010). There is a need for further investigation to understand this seeming discrepancy.

To help students understand the importance of evaluating their sources, it might be useful to give course assignments that have such an expectation. Rubrics for evaluating bibliographies can be helpful for this purpose (Foutch, Griffith, Lannom, Sommer, & Weiner, 2009). Providing more

extensive pre-testing to help students know when they are prepared enough to opt out of the tutorial could result in modules that were more effective in providing the information desired in an engaging manner. Most importantly, designing short tutorial components matched to targeted course goals would provide flexibility in accessing content appropriate for any first-year course.

This was not designed as a true comparison study, which is a limitation. Nursing students were required to take all of the CORE modules before responding to the survey, while biology students selected the modules they wanted to take. That difference may have had an effect on the students' responses.

CONCLUSION

The importance of information literacy in providing the college student with the tools for lifelong and effective learning and decision-making is evident. Online tutorial modules exemplify the flexibility and capability needed for students to acquire essential information literacy competencies. Online learning can be effective if the learner perceives it as useful. Non-linear learning that occurs through tutorial modules is a desired approach that provides access to the content of interest at an optimal time through self-directed learning. This concept enhances interest and learning capability. Barbour and Reeves (2009) described the concept of virtual schooling that involves high-quality learning opportunities and educational choice. This form of instruction may be well-suited to a postsecondary student who possesses an independent orientation toward learning with enhanced literacy and technology skills.

When the two groups of students in this

study critiqued an online information literacy tutorial, there were important differences in their perceptions. Nursing students were required to complete all of the modules. About one-third of biology students completed all parts of the tutorial. The results indicated that the students in both groups wanted changes in the length and presentation of the tutorial. The results reported here support the idea that tutorials must include material that the students perceive as immediately useful. That perception is related to course assignments and the students' personal characteristics.

The findings from the survey indicate that there is value in soliciting feedback about the content and format of tutorials from potential student user groups. This information from the target market can be incorporated into the development and modification process. The survey results are the reflections of first-year biology students and nursing students at one university. The intent of the survey was to determine the student perspective on changes needed in online tutorials dealing with information literacy and related issues. It was feasible to involve students in the instructional process by having them evaluate the instruction provided.

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APPENDIX

Survey on CORE tutorial

Which module(s) of the CORE tutorial did you complete?

- Planning Your Project
- Topic Exploration
- Types of Information
- Search Tools
- Search Strategies
- Evaluating Sources
- Copyright, Plagiarism, & Citing Sources

List the most important things you learned from the CORE tutorial.

- The most important things I learned from the CORE tutorial were:

What information that was in the CORE tutorial did you already know before you took the tutorial?

- I already knew:
- I did not know any of the information that was in the CORE tutorial

What did you like about the CORE tutorial?

- I learned important information
- It was the right length
- I could work on it online
- Other (PLEASE SPECIFY)

What did you not like about the CORE tutorial?

- It was too long
- It was too short
- I already knew what was in it
- Other (PLEASE SPECIFY)

I would like the CORE tutorial better if it (check all that apply):

- Was a podcast
- Was a video
- Had audio
- Was accessible through my cell phone
- Other (PLEASE SPECIFY)

What other research, library, or technology skills would you like to learn through an online tutorial?

- More about library databases
- Using Microsoft Excel
- How to create PowerPoint presentations
- How to evaluate the quality of information
- How to cite references in a bibliography for my papers
- How to find statistics for my courses
- Other (PLEASE SPECIFY)

Background Question: In what level of class are you? (Choose one)

- First-year
- Sophomore

- Junior
- Senior
- Graduate Student
- Other (PLEASE SPECIFY)

Background question: What is your gender?

- Male
- Female

In what College or School is your major?

- College of Agriculture
- College of Consumer and Family Sciences
- College of Education
- College of Engineering
- College of Liberal Arts
- Krannert School of Management
- College of Pharmacy, Nursing, and Health Sciences
- College of Science
- College of Technology
- School of Veterinary Medicine
- I haven't declared a major
- Other (PLEASE EXPLAIN)