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Developing Online Tutorials to Improve Information Literacy Skills for Second-Year Nursing Students of University College Dublin

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This article explores the process of developing online tutorials for a specified student group, in this case Second-Year Nursing students in University College Dublin. The product was commissioned by the Health Sciences Library and the UCD School of Nursing, Midwifery, and Health Systems. It was developed as a "Capstone Project" for part fulfillment of the MLIS in UCD.

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We focused our research on three areas of scholarship to assist in the development of our product, namely Information Behavior, Learning Technologies, and Learning Science and Design. Flemings VARK model was used to inform the team of the four different learning styles (visual, auditory, reading, and kinesthetic) and to match the presentation style to these.

An initial difficulty in the assessment phase was one of access to a large group of students, as the students were on clinical placements. We created personas and a profile of nursing students to try and compensate for this. The tutorial was developed to cater for this specific group of students and later to act as a valuable support to the Library, which is under severe pressure in terms of staff availability to support student learning.

The product is relatively straightforward to produce (and maintain) and is something the Library will be able to develop and add to in future years.

KEYWORDS articulate e-learning software, information literacy, online tutorials, nursing education, academic librarians, academic literacy, evidence-based research, plagiarism, academic essay writing

BACKGROUND AND CONTEXTUAL INTRODUCTION

With staffing numbers falling in University College Dublin's (UCD) library services and student numbers rising, online tutorials offer UCD library the scope to provide services to students beyond the direct instruction mode. An online resource offers the capability to meet patrons' needs on a 24/7 basis and broadens the number of instructional methods made available.

The UCD's Nursing School was highlighted by the library as a priority for support with information-literacy instruction. The online tutorial discussed in this article has thus been developed for second-year nursing students to offer the virtual space and ability to control the pace at which they can expand their information literacy.

The project was completed with the input and support of the UCD Library, the UCD Health Sciences Library, and the Health Sciences Liaison Librarian (HSLL). The faculty of the UCD School of Nursing, Midwifery, and Health Systems (SNMHS) provided assignment feedback for students on which a framework for the tutorial was developed. The UCD Teaching and Learning Center provided the hardware and software to develop the tutorial, and the UCD Access Office evaluated the tutorial to ensure it created no barriers for those with access issues.

PROJECT AIMS

The overall aim of this project was to design an online teaching resource to support second-year nursing students with their studies and development of information literacy skills within the SNMHS. The project addresses the specific information literacy requirements of second-year nursing students, with a view to providing round-the-clock accessibility.

These aims were met through the following objectives:

1. Conducting background research via a needs-assessment and a literature review.
2. Designing and developing an online tutorial with three core components designed to meet the requirements of the needs assessment.

LITERATURE SURVEY

Theoretical Frameworks and Models

In order to create the tutorial and properly examine the data gathered, the team selected areas of scholarship to research. These areas were chosen based on their relevance, prominence, and esteem in both technological and educational literature. The following theories and models greatly informed the subject matter through the development stages of this project.

Information Behavior

This area of scholarship enlightened discussions regarding information seeking and processing strategies of professional and student nurses. A majority of case studies emphasized how time constraints cause a reluctance to change information-seeking patterns (McKnight 2006; Coumou and Meijman 2006). McKnight, via participant observation and interview, observed that nearly all of her nursing professional participants felt using electronic resources was too time-consuming and would, therefore, consult other healthcare workers or patient charts for answers. Common barriers were the "navigability of electronic systems. . .information was not recorded where it was expected to be. . .they could not figure out where to start accessing some information" (McKnight, 149). Although most current information resources in modern medicine practice are electronic (Majid et al. 2011, 230), Stokes and Urquhart found that Google is preferred over subscription databases (2011, 910).

The team concluded that instruction should be succinct and efficient information seeking strategies promoted, as individuals often become discouraged by irrelevant searches (Kuhlthau quoted in Fisher et al. 2005, p. 82).

Learning Technologies

To map technologies currently used to enhance teaching practices, the group delved into literature discussing the advantages of hypermedia tutorials. This allowed accurate pinpointing of what to include and exclude from the tutorials. When developing and designing any online tutorial, it is imperative that the tutorial assist with better teaching practices and accommodate the needs of the learner efficiently (Beyth-Marom et al. 2005, 245). For nursing students, this includes a preference that the courses be web-enhanced rather than simply web-based (Creedy et al. 2007, 461) with a strong level of interactivity included via hypermedia (a combination of text, image, sound, animation, and video). Active learning emerged as the most beneficial method to students' understanding of a lesson (Beyth-Marom et al.; Hadfield et al. 2007), whereas other elements, such as text layout, graphics, and audio (Zhang 2006) also guided design decisions.

Learning Science and Design

To understand the content the tutorials would tackle, the benefits of instructional scaffolding, constructivist learning theory, and formative assessment were explored. The tutorial should encourage active learning by setting meaningful tasks and aid in developing students' critical thinking skills (Woodard 2003). As the tutorial is an online asynchronous resource, it is important to include formative assessment to deliver feedback to the students on their progress (McCulley 2009, 172).

Fleming's VARK Model

This comprehensive model informed the team of the four different learning styles that students may exhibit, which are categorized as visual, auditory, reading, and kinesthetic. The VARK model proposes that matching presentation style to learning style focuses students attention (Fleming and Mills 1992). The model is significant in terms of designing a resource that accommodates accessibility.

METHODOLOGY

There were two phases involved in the production of this tutorial:

1. Formative research
2. Design and development of the tutorial

The team selected this method of qualitative steps to ensure accuracy and efficiency throughout the study. The structure of this project took roughly eight months to complete, spanning January to August 2012. The first four months were dedicated to the research and planning stages, two months were then given to producing the product, following an additional two months of testing, revising, and conclusions.

FORMATIVE RESEARCH: AIMS AND APPROACH

This phase had three main objectives; first, to assess the needs of the UCD Library, HSLL, and the SNMHS; second, to acquire a profile of the second-year nursing student, paying particular attention to their attributes and learning needs; and third, to understand the practical implications that online tutorials would have for the library staff.

NEEDS ASSESSMENT

A needs assessment was undertaken to identify and assess the information literacy requirements of UCD's second-year nursing students. The assessment was carried out through a process of face-to-face meetings, held with UCD Library staff, the Health Sciences Librarian, and the Academic Coordinator for the Second-Year Nursing Program. It was not possible to involve student nurses during this phase of preparation, as they were taking part in clinical placements. The outcome of each meeting is explored in the following sections, and each stage assisted in the team formulating goals, objectives, and learning outcomes of the project.

UCD Library Perspective

The needs assessment began with counsel from the university's library, to gain insight into the current issues the library faced in providing academic support to the students of UCD. Based on the nature of the library's provision of services to all UCD schools and support of all disciplines, any research needs that existed with UCD students could be more easily identified by this department. The UCD Library context was one of staff shortages and an overwhelmingly busy reference desk due to the mismatched ratio of student to librarian. In fact, the UCD annual profile for the academic year of 2011/2012 published numbers of nearly 25,000 attending students and over 1.7 million visits to the library's facilities (*UCD Profile by Numbers*, May 2012). Library staff noted that a majority of requests during these visits were for assistance with various research assignments. In particular, students

were unaware of relevant databases, search procedures, writing rules, and plagiarism considerations.

Alleviating this predicament became a priority for the library. Web-based instructional tools were selected feeling that the future path for assisting a growing student population with limited resources and adapting to a technologically-ubiquitous society rested in this format. To assist with patron requests, library staff specifically identified nursing students as a priority for information literacy instruction, because these students have exacting schedules and work-loads.

Health Sciences Liaison Librarian Perspective

Following on from this, a meeting was conducted with the Liaison Librarian for the College of Health Sciences, as the nursing school falls under this domain. Second-year nursing students were highlighted as the main concern in terms of needing information literacy support. The key needs identified were: assistance in locating specific types of articles and case studies, interpreting clinical trials and deciphering qualitative and quantitative study types, and locating and evaluating information on suitable health websites.

The Liaison Librarian confirmed that due to budgetary and time constraints, second-year nursing students had experienced a cutback in information literacy support, particularly in regard to the exclusion of face-to-face instruction in 2011. The Liaison Librarian provided quantitative data gleaned from the surveys completed by second-year students who attended these sessions between the years of 2008 to 2010. The Librarian indicated that the brevity of the sessions was an issue, as the sessions were usually an hour or less and generally occurred weeks before actual assignments were due. It was also remarked that continued instruction and support was needed for the second-year students, as many had ranging levels of information literacy and refresher courses might remedy forgotten or unknown skills throughout the academic terms. Overall, the instructional sessions were well received by the students and feedback was remarkably positive as the statistics in Figure 1 from 2008, 2009, and 2010 indicate.

Across the three years that the surveys were collected, an average of 88% of second-year nursing students found the sessions engaging, 95% felt the sessions were informative, and 99% thought the sessions were relevant to their education. Responses also indicated that the content found most useful concerned databases, search tactics, Boolean operators, locating articles relevant to the nursing discipline, defining a search, using Google Scholar, using and forming appropriate citations, searching relevant nursing websites, accessing different databases, and using off-campus resources. The Project team therefore acknowledged the need to provide support to these areas in the online tutorial.

Statistics of Second-Year Students' Feedback for Information Skills Classes				
Level of Interest in the Topics Covered				
	Fascinated	Interested	Not Very Interested	Bored
Average of 254 students from 2008-2010	21%	67%	11%	1%
Information Learned from the Course				
	A Lot	A Good Amount	Not Much	Nothing
Average of 251 students from 2008–2010	45%	50%	5%	0%
Relevance of the Course to Their Education				
	Very Relevant	Relevant	Barely Relevant	Not Relevant
Average of 252 students from 2008–2010	66%	33%	1%	0%

FIGURE 1 Student feedback for information literacy instruction. Second-year Nursing Students (2008, 2009, and 2010) Susan Boyle, College Liaison Librarian, UCD.

Academic Second-Year Coordinator Perspective

Correspondence with the Academic Coordinator for the Second-Year Nursing Program began with a useful outline of the average second-year student, explaining that students needed to balance assignment completion, lecture

attendance, and clinical practice as part of their academic year. The Coordinator emphasized a number of common errors that commonly occurred with the students' assignments. A collection of the main problem areas are illustrated in Figure 2 accompanied by the team's objectives for tackling them.

The team grouped the identified issues into categories to better map the range of problems and to assist with the development of the tutorial's modules.

In a further face-to-face meeting with the Second-Year Coordinator, it was found that the academic staff of the nursing program were looking for resources to assist the students with their search tactics and writing skills.

PROFILE OF USERS

The professional body for nursing in Ireland, An Bord Altranais' guidelines for nursing education requires 170 weeks of instruction to be completed; no less than 70 weeks on theoretical instruction, 54 on clinical instruction, 39 on internship, and a 10-week "discretionary" component (An Bord Altranais 2005, 35). Second-year nursing students are transitioning from an academic based learning cycle to one of academic learning blended with clinical practice. The students tend to be incredibly time poor, as a result. As the students are rarely present on campus, they are suitable candidates for an online instruction resource.

USER PERSONAS

One of the constraints in the initial project development phase was lack of access to the nursing students. The project team therefore decided to create user personas to assist in the planning and design stages of the tutorial. Personas allowed the team to focus on the users' requirements of the tutorial as well as any idiosyncrasies particular to the second-year nursing student that should be acknowledged. Common practice in usability studies would be to include one-on-one interviews with the intended users prior to persona creation (Cooper 2004); however, the profiles and survey feedback provided by the Health Sciences Librarian and Second-Year Coordinator provided the team with sufficient information to create simulated student personas. This proved to be an asset to the team during development, as the personas provided focus to facets of a user-centric design (Grudin and Pruitt 2003). More important to the accuracy of the results, user personas established a consistent mental model for the team and also helped contextualize certain situations.

Quality of Argument and Expression	
Problem(s)	• Rarely cite from scholarly sources • Insert quotations without proper contextualization • Failure to analyze literature and offer narratives that weave personal knowledge with theory
Objective(s)	• Foster analytical thinking and discussion rather than description of literature used • Instruct how to support arguments with students' own experiences and their academic sources
Sources	
Problem(s)	• Do not provide correct in-text citations • Fail to provide a complete full reference listing
Objective(s)	• Help students understand what constitutes an academic source • Illustrate how to correctly cite works referenced within the body of the essay • Compile an alphabetical and complete reference list at the end of the essay
Range and Accuracy of Knowledge	
Problem(s)	• Lack of variety and accuracy in the information provided • Little or no reference to topical or relevant scholarship • Over-reliance on direct quotes with no attempt to explain the literature in own language
Objective(s)	• Assist students in structuring an outline
	• Help locate relevant resources through database searches and evaluation of the literature
Structure and Focus	
Problem(s)	• Lack logical structure, focus, and consistency • No headings to sectionalize discussions • Lack of connecting answers to the original question
Objective(s)	• Provide strategies to improve the quality of the layout • Instruct how to keep discussions relevant to the topic
Presentation and Writing	
Problem(s)	• Work is presented in bulleted list form • Emphasis is placed on points via text editing • Incorrect use of full sentences, paragraphs, and inconsistent use of language • Presence of colloquial language and spelling mistakes
Objective(s)	• Illustrate proper formatting and styling • Instruct on the use of grammar and spell check

FIGURE 2 Second-year nursing students: problem areas. (Feedback on second-year student assignments). Dr Gabrielle O'Kelly, School of Midwifery & Health Systems, Health Sciences Centre, University College Dublin.

DESIGN AND DEVELOPMENT OF THE TUTORIAL

Aims and Approach

Based on the cognizant of guidelines for information literacy standards the team decided that it was best to provide a resource to the students that is available on a continuous basis, remotely accessible and that is relevant at the time that they are undertaking assignments. The data collated from the needs assessment emphasized students' preference for ease of access to materials. The objective was to develop a tutorial that is innovative in design and that incorporates interactivity. These features were highlighted in the literature review as particularly important when sustaining a student's attention in the online learning environment. An environmental scan of the resources currently available to students via UCD Library, confirmed that students were provided with online instruction via PDF documents and video pieces. The research data confirmed that the students were not in receipt of effective academic support for their coursework.

After isolating the specific areas of instruction, work began on creating the tutorial with the aim of producing a focused and effective product. The literature review surrounding effective tutorial design advised the compilation of a set of standards to adhere to. The guidelines were as follows:

- The tutorial must contain an aural accompaniment.
- Text should appear in straightforward easy to understand language.
- Introductions must identify the problem statement(s) that the tutorial addresses.
- Font size and style should be legible and Sans-Serif.
- Coloring of text must carry white backgrounds with black font.
- Interactivity must be incorporated.

To create the different modules for the tutorial, storyboards were used to map out the instructional elements, completed first in Microsoft PowerPoint to create the individual frames. Articulate Presenter Version 2.3 was then used to convert the PowerPoint layouts into Flash videos and allowed for the incorporation of multimedia content. Finally, voice-over narration was recorded to the narratives using tools supplied by the Articulate software.

Key Considerations in Tutorial Development

There were several key considerations emerging from the literature which directed the team's choices in pedagogical strategies and in the development of the tutorial. These considerations are outlined in the following section.

Pedagogical Strategies

The SCONUL Seven Pillars of Information Literacy Core Model for Higher Education guide formed the foundations for the development of the tutorial content and provided a background as to what an information literate student is and should have the skills to do. The SCONUL (2011) guide specifies that an information literate student can identify that they require information; know their current level of knowledge about a topic; have search tactics for acquiring information; and can gauge the types of information they need, appraise information for validity, use information ethically, and present information in an effective and synthesized manner.

A constructivist learning approach was incorporated into the information literacy tutorial. Hadfield et al. (2007, 334–35) state that a constructivist approach to learning is the best fit for online learning to encourage critical thinking and higher order thinking skills. This approach involves the students as active participants in the learning process. Meaningful activities are selected for them to ensure that they acquire new information and skills (Cooperstein and Kocevar-Weidinger 2004, 141–42).

Educational scaffolding was another strategy that was utilized in the development of the tutorial. Scaffolds are used when a student is acquiring new information and provide support to the student as they progress through the tutorial. Information is layered in such a way that the student moves from learning the basics to a place where deeper learning occurs (Meister and Rosenshine 1992).

Feedback was considered important to incorporate into the tutorial as this allows the students' to know if they have successfully achieved the desired learning outcomes of the course (Zhang 2006, 303). Quizzes and games are deemed effective methods of providing feedback, as these elements encourage a user to engage with the materials (Plumb 2010, 51).

Tutorial Content Development

The tutorial consisted of three modules that address the problem areas as identified by the needs assessment data. The first module "Evidence Based Research and Critical Thinking" provides assistance with database searching, evidence based research and evaluating resources (duration with audio: 30 minutes 48 seconds, without audio: 13 minutes 17 seconds). The second module "Plagiarism and Citation" provides support in the areas of ethical use of information and using the citation style for the School of Nursing Midwifery and Health Systems (duration with audio: 18 minutes 14 seconds, without audio: 5 minutes 57 seconds). The third module "Academic Writing" provides support with essay structure and writing (duration with audio: 10 minutes 37 seconds, without audio: 6 minutes 8 seconds). The

three modules are divided into lessons and the lessons are further broken down into sections, to provide support to the students in the required areas.

Module 1: Evidence Based Research and Critical Thinking. This module assists students in assessing a patient's needs and teaches them strategies to acquire information relating to patient issues. These skills are important to learn and endeavor to support the students with their modules such as Nursing the Older Adult and Other Populations, General Nursing, and Patient Safety.

From this component of the tutorial, the students learn how to locate information, how to conduct accurate database searches, how to assist with patient queries and how to evaluate literature. Evidence based medicine principles are incorporated into the tutorial to provide a context for the learning and to relate the acquiring of information skills to the students discipline. Sackett states that "Evidence based medicine is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients" (as cited in Abalos et al. 2005, 15).

One of the first steps in the EBM process is formulating a specific clinical question to ensure that correct information is located. This helps the student to analyze medical queries and to decide whether the area that the query relates to falls under a prognosis, diagnosis, therapy, or harm (Adams et al. 2007, 2). Adams et al. (2007, 2) state that, EBM is important as it aids in clinical decision making that is substantiated by the relevant literature. It ensures that better health care is practiced and ties the practical aspects of the nursing role to the theoretical background that frames the discipline. Becoming proficient in EBM can help to develop life-long learning skills that can be utilized throughout the students' course of study and within their working careers.

These skills will be developed as the students' progress through the lesson and acquire information about developing clinical queries, about the different levels of evidence, database searching, evaluating sources, and using sources of evidence.

Learning Outcomes for Module 1

- The students, exhibit an understanding of evidence based research and the importance of this concept to nursing and to their studies.
- The students learn to formulate clinical queries and develop focused research questions.
- The students become aware of the databases relevant to their discipline and have the skills to manipulate these.
- The students acquire the knowledge to critically evaluate information by taking into account the nature of the study, authorship, currency of the information, and relevance to their clinical query.

Module 2: Plagiarism and Citation. This section of the tutorial assists the students in the areas of accurately citing resources in their assignments, while also providing them with information on how to avoid plagiarism. This section is vital in terms of meeting the requirements of the second-year nursing students, as the needs assessment highlighted that citation and plagiarism are a major problem area for them.

For the plagiarism component of this section, the overarching emphasis was on creating simple, effective and clear instructions based on the UCD SNMHS plagiarism guidelines. These guidelines are readily available on the UCD website; however, the information provided is extremely text heavy, with a lengthy 24 pages to read through.

From this section of the tutorial, students learn about the concept of plagiarism in line with the relevant UCD guidelines. This information is presented in a more concise format, through breaking the concept down into small manageable pieces of data that provide explanations on what plagiarism is, different types of plagiarism and how to avoid it. Presenting the information in a simple format ensures that students will not be overwhelmed.

The citation part of this section aims to provide students with assistance on the Harvard referencing style (the citation style for UCD SNMHS). Developing the content for the citation section involved collating information from the current resources offered by the UCD SNMHS and the UCD Library website.

Learning Outcomes for Module 2

- The students understand the concept of plagiarism.
- The students use information in an ethical manner.
- The students know the referencing style for the Nursing discipline.
- The students develop the competencies and proficiencies to accurately cite their sources of evidence.
- The students compile accurate bibliographies for their assignments.

Module 3: Academic Essay Writing. This section of the tutorial was designed to assist students in the area of academic writing and to provide information on how to structure an academic essay, how to adopt genre specific writing skills and how to avoid common mistakes in the essay writing process. This was a necessary component of the tutorial, as the needs assessment highlighted a number of common errors in the second-year students' assignments.

According to Lea and Street (1998), there are contrasting expectations and interpretations of undergraduate written assignments between academic staff and nursing students. There appears to be significant gaps present between what academics assume nurses know and what nurses actually know, at their current level of training. McLaughlin (2007) refers to a number of

recurrent specific issues present in the undergraduate nursing students' work, including: assignments written in "nurse speak," that is, lacking appropriate punctuation and composition principles, presentation of completed work lacking professional detail expected of nurses and an overall lack of writing competencies that would be expected to be present in the nursing students at this stage in their formal education. McLaughlin offers a possible cause for this apparent lack of written competencies in nursing students "nursing students are very literal; they like to have a recipe and then attempt to apply it" (88). These issues seem to match the common errors gleaned from the needs assessment component of the team's research. As such, the team designed this module around the idea of scaffolding the nursing students through the correct composition, punctuation and presentation principles required of them in an academic assignment. In addition, the team designed the module for the students to have a "recipe" they could easily apply to their assignments, targeted specifically at common errors for them to avoid in the process.

Learning Outcomes for Module 3

- The students develop the ability to write in accordance with the approved school academic writing format.
- The students understand the techniques and strategies needed to write a well-structured essay following the conventions of their discipline.
- The students develop an awareness of the common pitfalls in academic essay writing and will understand the strategies necessary to overcome them.

Software Selection for Tutorial Development

Plumb states that when choosing the software to develop e-tutorials, decisions should be based on criteria such as cost, technical abilities required by users, whether interactivity can be incorporated and if image and sound files can be inserted (2010, 54). Articulate software was chosen as the medium to develop the online tutorial as this software was widely used by UCD Library and proved compatible with the existing library technology framework. There were also cost benefits for the Library, removing the need to invest in additional software, and further tutorials can be created without the need for staff training. The software was sourced through the UCD Teaching and Learning Centre. The team found Articulate to be user friendly, allowing for the creation of interactive tutorials, and capable of presenting information in a number of formats to attract and sustain the user's attention.

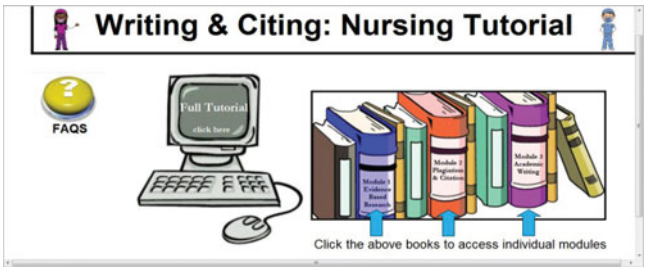

FIGURE 3 Splash screen.

Designing the Tutorial to Support Learning

When developing the tutorial careful consideration was given to the needs of the students in terms of how they engage with and process information. Research shows that there are different types of learners and these can be categorized as visual, auditory, reading and writing, and kinesthetic learners (Flemings and Mills cited in Bonk and Zhang 2006, 250). It was vital, therefore that the learning technologies employed in the e-tutorials catered for these various learning techniques to maximize the effectiveness of the module content.

To accommodate the different learning styles, hypermedia elements, such as text, image, sound, and video slides, were incorporated. A splash screen was introduced at the beginning of the tutorial to allow the user to choose from the outset which module to focus on (see Figure 3). A "frequently asked questions" was also incorporated to provide focus to the user on the area of the tutorial that they require.

The team also introduced an option for users to take the tutorial with or without audio accompaniment (see Figure 4). Audio was highlighted as an

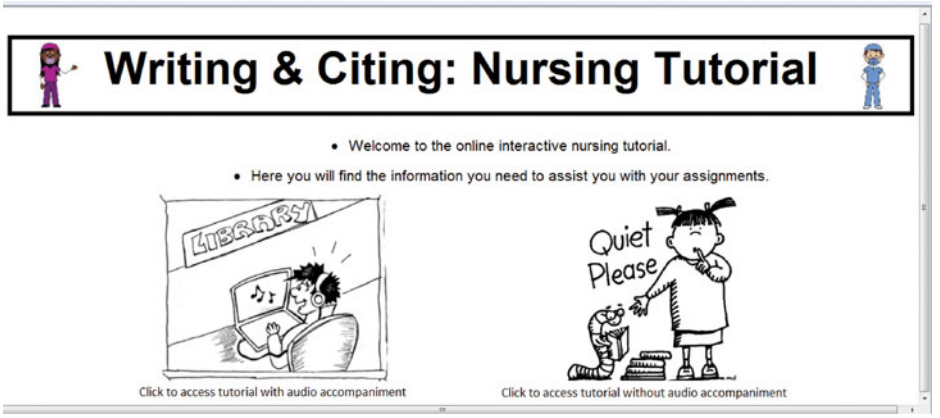

FIGURE 4 Options for audio selection.

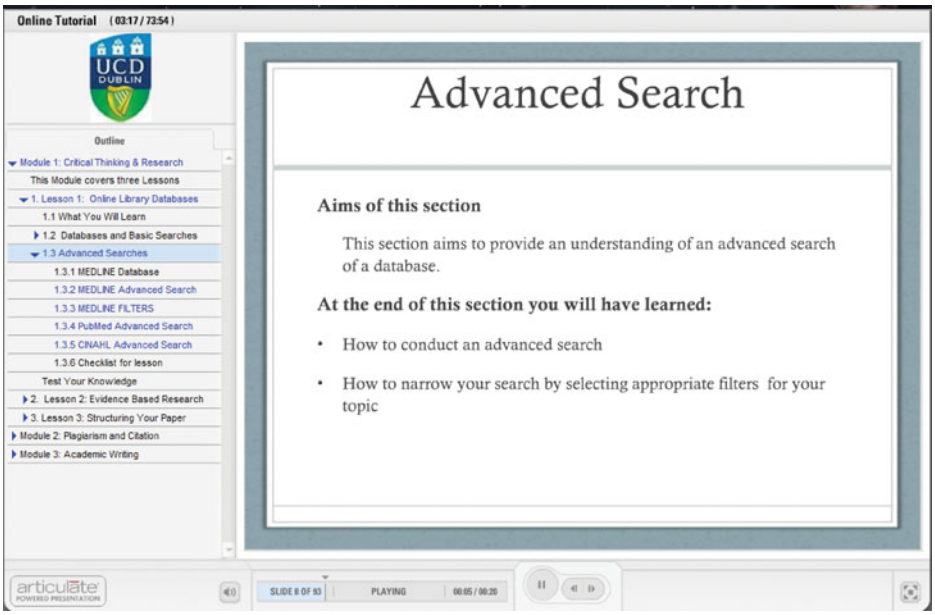

FIGURE 5 Black text on a white background: primary display method for content.

important feature by both the Health Sciences Liaison Librarian and the UCD Access Officer, to ensure the tutorial was accessible for a broad spectrum of students. It was further recommended by the UCD Access Officer to provide a word document of the tutorial content. Following this recommendation, an alternative text document including the full content of the tutorial was created. This document was developed according to appropriate online screen reader guidelines as advised by the Access Officer.

It was also found that tutorials consistent in design with regard to headings, text, navigation, color, images, and audio help accommodate users with disabilities, while also presenting a professional image of the tutorial to the end user (Plumb 2010, 52). The team ensured the features employed in the online tutorial maintained a uniform look throughout.

Text was displayed in Arial font and headings were kept consistent in style. Black text on a white background was chosen as the primary display method for the content, informed by the literature on effective design of multimedia applications (Fahy 2004, 156) (see Figure 5). Using these colors together ensures that the text is legible to users.

The uniformity was further kept consistent through the introductory slides at the beginning of each lesson within the modules. A "what you will learn from this lesson"‘ slide was incorporated at the beginning of each lesson (see Figure 6) and an "aims and learning outcomes" slide was introduced at the beginning of individual sections.

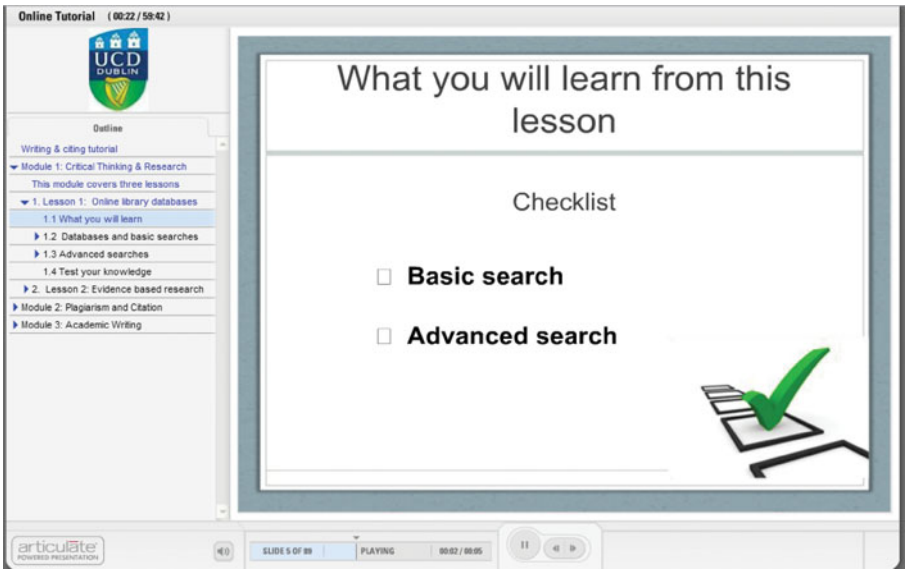

FIGURE 6 Lesson introduction.

At the end of each section, a checklist illustrates the completed parts of the lesson to the user (see Figure 7).

Graphics were also extremely important to the web tutorials, as research shows they make the content more appealing to users and provide a break

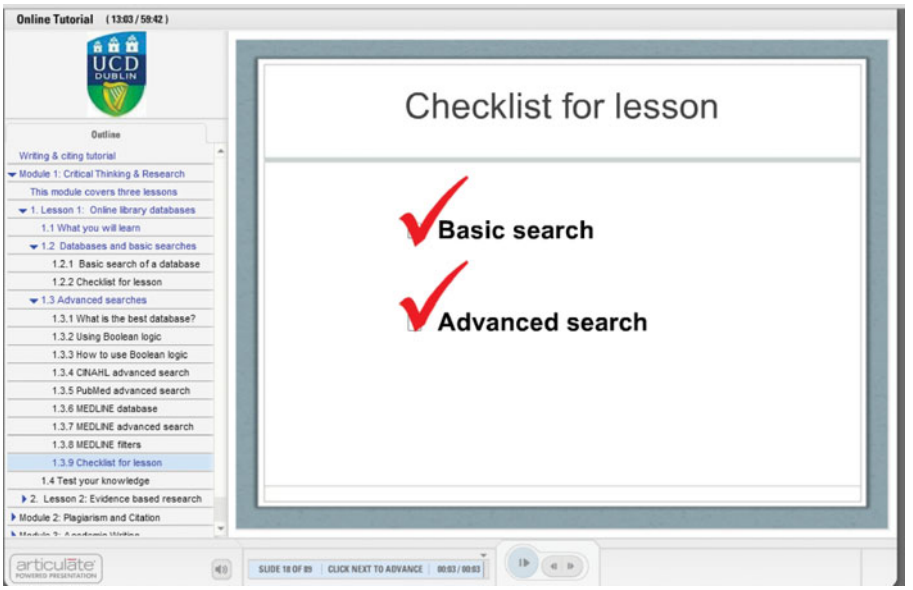

FIGURE 7 Lesson checklist at end of each section.

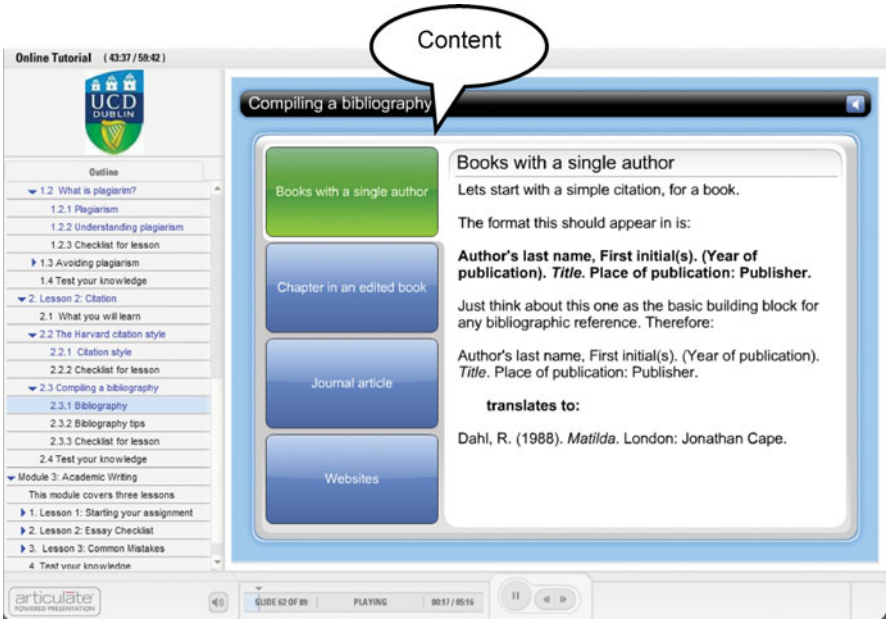

FIGURE 8 Content divided into manageable sections.

in the text (Zhang 2006, 299). The graphics chosen and the layout of information were utilized to present the tutorial content in a manageable and comprehensible fashion (see Figure 8).

A blend of hypermedia elements were chosen to engage the user and to provide support to the various learning styles (see Figure 9).

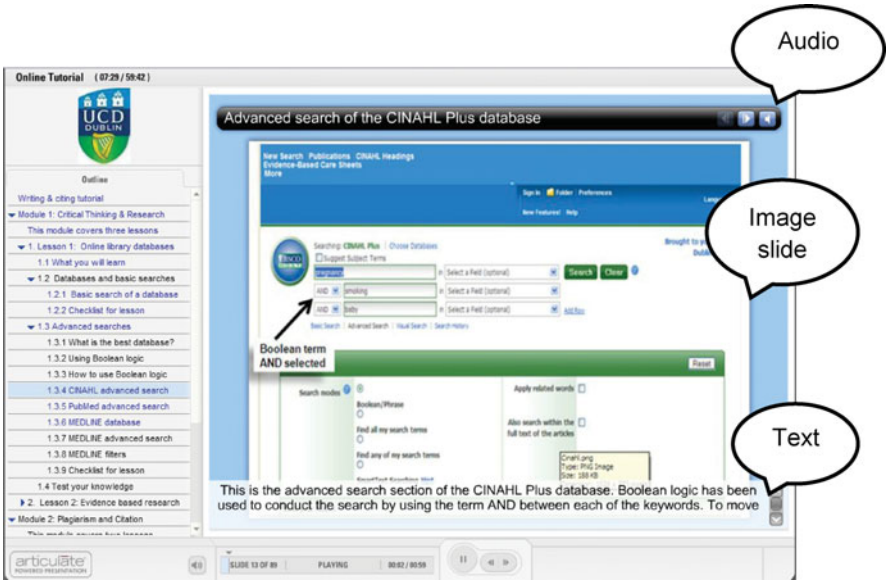

FIGURE 9 Hypermedia elements (reproduced with permission of EBSCO.COM).

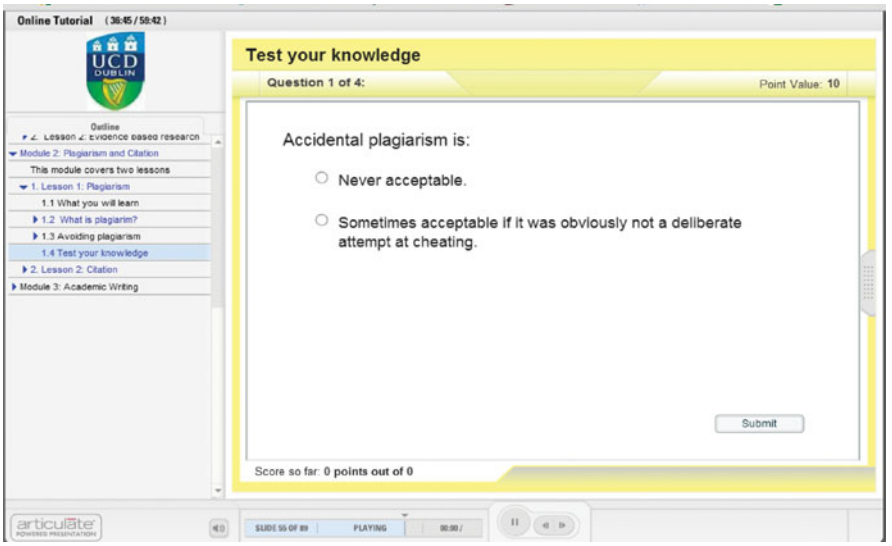

FIGURE 10 Interactive quiz.

Interactive components were also incorporated, as these are necessary features of e-tutorials that seek to develop the critical thinking and analysis skills of the learner. Interactivity allows for a user-centered approach and offers an option for the student to self-assess their progress where quizzes and tests are utilized (Zhang 2006). Throughout the tutorial, interactive quizzes

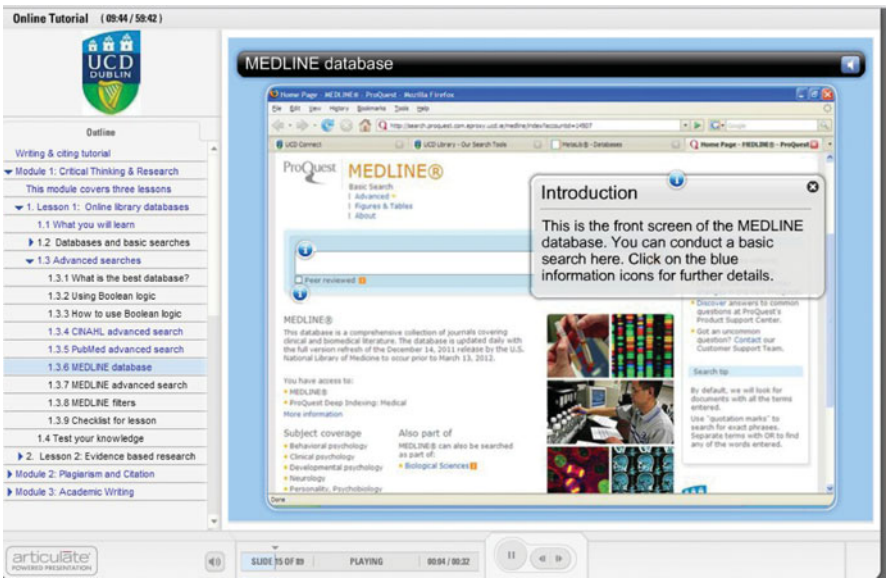

FIGURE 11 Onscreen interactive navigation. (Published with permission of ProQuest LLC. Further reproduction is prohibited without permission.www.proquest.com)

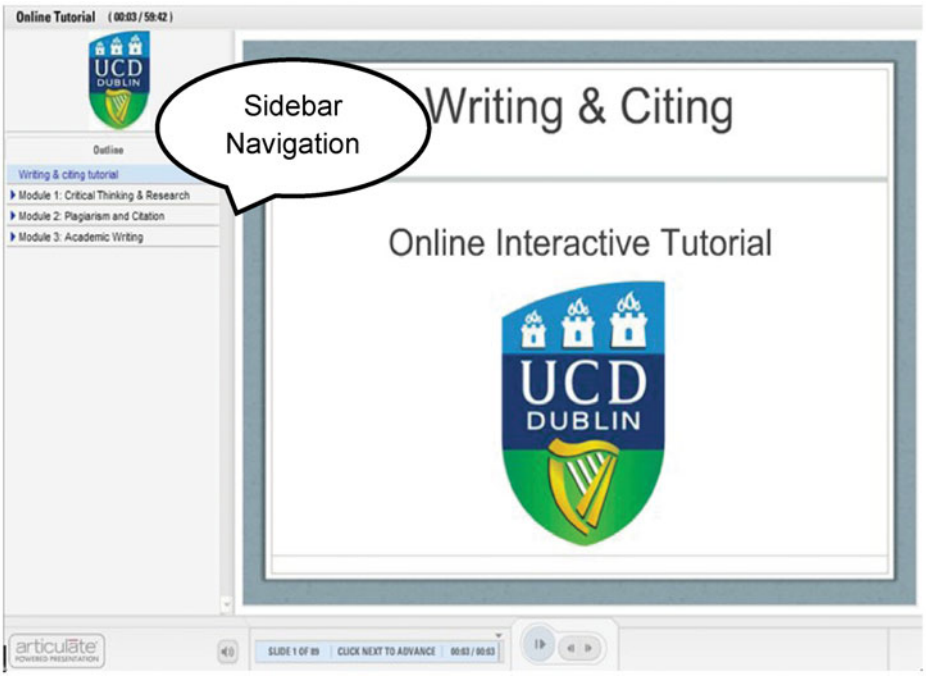

FIGURE 12 Sidebar navigation.

are included to keep the students engaged in the learning process and to help them to assess their knowledge of the module content (see Figure 10).

Interactivity was also incorporated through the slide navigation, provided through on-screen interactive buttons that require the user to click on them to access information (see Figure 11). This ensures that the users' attention is sustained and that they are actively involved in their own learning throughout the module.

Navigational links are essential for the user to work through the tutorial and to have a sense of control over their own pace of learning. These directional components facilitate ease of access to the material and should be placed in a consistent position throughout (Zhang 2006, 300). A sidebar was developed in Articulate that laid out each module of the tutorial and each lesson within that module (see Figure 12). The inclusion of the sidebar navigation provides the user with a certain amount of control over their learning. This feeds into the constructivist learning theory where students are active participants in their own education.

CONCLUSION

This report is the culmination of many different strands of research being weaved together in the development of the online information literacy

tutorial for nursing students. The findings from the literature review, environmental scan, needs assessment, and examination of other information literacy resources available online together form the basis for the tutorial, rooting it in strong theoretical models while also ensuring it remains in line with best practices for the development of such resources.

The development phase comprised of key considerations to ensure the tutorial design and layout was conducive to teaching information literacy skills to the second-year nursing students. It was vital not only for the content to be relevant and applicable to the students coursework and clinical practice but that effective pedagogy strategies were employed to assist the students in their acquirement of information. Key to getting this right was the physicality of the tutorial and how it would sit as a stand-alone resource without a teacher or librarian present. Research into the design of online resources was testament to the fact that certain standards need to be followed and specific functions need to be implemented into the features of the tutorial. The inclusion of interactive components and hypermedia elements greatly supported the design team in developing a resource to match the student needs. Along with this, the project team implemented features to ensure the resource was accessible to the students and that uniformity was maintained throughout the three modules. The resulting product is a well-informed, structured, and engaging resource based on in-depth research.

The tutorial represents a medium through which a currently underserved student population can access information they need in a convenient format that is innovative in design and features, when compared with the existing online UCD library resources. It can address a gap in the information literacy support provided for the particularly time-poor and location-constrained UCD nursing students. More broadly it could act as a promotional tool for the library, increasing its "visibility" to students not otherwise frequently physically present. Finally, it allows the library to address the needs of its user population in a time of severe budgetary and staffing constraints, with the physical or face to face presence of the librarian no longer the sole means of providing information literacy instruction to students.

REFERENCES

Abalos, E., G. Carroli, and M. E. Mackey. "The Tools and Techniques of Evidence-Based Medicine." *Best Practice & Research Clinical Obstetrics and Gynecology* 19.1 (2005): 15–26. Print.

Adams, M. B., P. Fontelo, S. Keitz, T. Owens, and C. Schardt. "Utilization of the PICO Framework to Improve Searching PubMed for Clinical Questions." *BMC Medical Informatics and Decision Making* 7.16 (2007): 1–6. Print.

An Bord Altranais. *Requirements and Standards for Nurse Registration Education Programmes*. 3rd Edition. Dublin: An Bord Altranais, 2005.

Banning, M. "Measures That Can Be Used to Instill Critical Thinking Skills in Nurse Prescribers." *Nurse Education in Practice* 6.2 (2006): 98–105. DOI:10.1016/j.nepr.2005.10.001. Print.

Beyth-Marom, R., A. Caspi, and K. Saporta. "Synchronous vs. Asynchronous Tutorials: Factors Affecting Students' Preferences and Choices." *Journal of Research on Technology in Education* 37.3 (2005): 245–61.

Bonk, C. J., and K. Zhang. "Introducing the R2D2 Model: Online Learning for the Diverse Learners of This World." *Distance Education* 27.2 (2006): 249–64. Print.

Cooper, A. *The Inmates are Running the Asylum*. Indianapolis, IN: McMillan Computer Publishing, 2004. Print.

Cooperstein, S. E., and E. Kocevar-Weidinger. "Beyond Active Learning: A Constructivist Approach to Learning." *Reference Services Review* 32.2 (2004): 141–48. Print.

Coumou, H. D., and F. J. Meijman. "How Do Primary Care Physicians Seek Answers to Clinical Questions? A Literature Review." *Journal of the Medical Library Association* 94.1 (2006): 55–60. Print.

Creedy, Debra K., Marion Mitchell, Philippa Seaton-Sykes, Marie Cooke, Elizabeth Patterson, Christine Purcell and Patricia Weeks. "Evaluating a Web-enhanced bachelor of nursing curriculum: perspectives of third-year students." *The Journal of Nursing Education* 46.10 (2007): 460–467.

Fahy, P. "Media Characteristics and Online Learning Technology." In T. Anderson and F. Elloumi (Eds.). *Theory and Practice of Online Learning* 2004 (137–74). Canada: Athabasca University. Web. 15 Jun. 2012. <http://cde.athabascau.ca/online_book>.

Fisher, K. E., S. Erdelez, and E. F. McKechnie, (Eds.). (2005). *Theories of Information Behavior*. ASIST Monograph Series. Medford, NJ: Information Today, 2005. Print.

Fleming, N. D., and C. Mills. "Helping Students Understand How They Learn." *The Teaching Professor* 7.4 (1992). Print.

Grudin, Jonathan and Pruitt, John. "Personas: practice and theory." In Proceedings of the 2003 conference on Designing for user experiences: ACM, 2003.

Hadfield, M., G. Howarth, M. Hutchings, and S. Lewarne. "Meeting the Challenges of Active Learning in Web-Based Case Studies for Sustainable Development." *Innovations in Education and Teaching International* 44.3 (2007): 331–43. Print.

Lea, M. R., and B. V. Street. "Student Writing in Higher Education: An Academic Literacies Approach." *Studies in Higher Education* 23.2 (1998): 157–73. Print.

Majid, S., S. Foo, B. Luyt, X. Zhang, Y. L. Theng, Y. K. Chang, and L. A. Mokhtar. "Adopting Evidence-Based Practice in Clinical Decision Making: Nurses' Perceptions, Knowledge, and Barriers." *Journal of the Medical Library Association: JMLA* 99.3 (2011): 229–36. Print.

McCulley, C. "Mixing and Matching Assessing Information Literacy." *Communications in Information Literacy* 3.2 (2009): 171–80. Print.

McKnight, M. The Information Seeking of On-Duty Critical Care Nurses: Evidence from Participant Observation and In-Context Interviews. *Journal of the Medical Library Association* 94.2 (2006): 145–51. Print.

McLaughlin, B. N. "Writing Competencies for Associate Degree Nursing Students." *Teaching and Learning in Nursing* 2.3 (2007): 88–89. DOI:10.1016/j.teln.2007.04.005. Print.

Meister, C., and B. Rosenshine. "The Use of Scaffolds for Teaching Higher-Level Cognitive Strategies." *Educational Leadership* 49.7 (1992): 26–33. Print.

Plumb, T. K. "Creating Electronic Tutorials: On Your Mark, Get Set, Go!" *Journal of Electronic Resources Librarianship* 22.1-2 (2010): 49–64.

SCONUL Working Group on Information Literacy. *The SCONUL Seven Pillars of Information Literacy Core Model For Higher Education*, 2011. Web. 20 May 2012. <http://www.sconul.ac.uk/groups/information_literacy/seven_pillars.html≥.

Stokes, P., and C. Urquhart. "Profiling Information Behavior of Nursing Students: Part 1: Quantitative Findings." *Journal of Documentation* 67.6 (2011): 908–32. Print.

Woodard, B. "Technology and the Constructivist Learning Environment: Implications for Teaching Information Literacy Skills." *Research Strategies* 19 (2003): 181–92. Print.

Zhang, L. "Effectively Incorporating Instructional Media into Web-Based Information Literacy." *The Electronic Library* 24.3 (2006): 294–306. Print.