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# Assessing Online Learning Objects: Student Evaluation of a Guide on the Side Interactive Learning Tutorial Designed by SRJC Libraries

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## Abstract

More and more of today's scholars conduct their research in a digital realm rather than using a print collection. The University of Arizona Libraries Guide on the Side tutorial software offers an opportunity to apply the principles of active learning with real world research scenarios. This paper reports on the design and introduction of interactive guided tools to support information literacy instruction in a community college setting. The initial implementation included 110 students who provided voluntary feedback about their perceptions and participated in a quiz assessing their comprehension.

Response to the tutorials was overwhelmingly positive, with 96% of students reporting an increased understanding of given research interfaces after taking the interactive tutorials. In testing, students exhibited greater comprehension of the scope of the research interface, with an almost 55% increase in student performance over students who did not take the tutorials.

**Keywords:** Learning Objects, Information Literacy, Interactive Tutorials, Guided Learning, Web-based Tutorials

## Introduction

More and more of today's scholars conduct their research in a digital realm rather than through a print collection. The Association of Research Libraries reports that academic libraries now allocate over 65% of purchasing budgets to electronic materials (Kyrillidou, Morris, & Roebuck, 2012). The learning objects used in information literacy instruction that help students utilize the complex features of these digital resources have not made the same migration to the electronic realm. Students face a vast array of library resources with unfamiliar and complex interfaces that challenge even the most capable scholar. The standard print-based library skills exercises are

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hampered in the ways in which they can effectively showcase the unique search tools available to students for effective and expedient research. Santa Rosa Junior College offers a typical research ecosystem, with a discovery layer, 40 individual databases, 5 e-book platforms, an online catalog, and a host of individual electronic journal subscriptions—all presenting unique search interfaces.

Students perform an average of 6.4 million searches of these resources in an academic year (Santa Rosa Junior College, 2014).

It is not surprising that first-year college students recently surveyed in the Project Information Literacy study indicated that completing college-level research assignments can be an “overwhelming” experience (Head, 2013). This is an even greater challenge in the community college learning environment where many students are underprepared or at a disadvantage to achieve information literacy. In California, 70-85% of students who are new to the community college system are assessed as needing basic skills courses in one or more subject areas (The Center for Student Success, 2007). At Santa Rosa Junior College, over 16% of those needing basic skills instruction also self-identify as students whose primary language is not English, adding an additional barrier to understanding complex research tools (Greaney, Hunter, & Chin, 2010). Libraries must provide students of all abilities unfettered access to quality information while presenting opportunities for students to boost their competency in using varied and complicated information resources. These services need to be delivered in an environment of 24/7 access that is often without the personal help of a librarian. How do libraries help students become proficient in using sophisticated digital search tools when so many different interfaces exist? Web-based instruction seems the most complementary vehicle for teaching students how to use these complex digital resources most effectively leading the authors to propose a digital web-based solution.

The objective of this project was to develop interactive learning tools capable of effectively introducing students to a range of available library research interfaces, and to assess their effectiveness. The project grappled with the problem of how best to help students become proficient in using a complex array of sophisticated digital search tools. This report describes the rationale and process involved in designing, developing, implementing, and assessing these online interactive learning objects in a community college instructional setting. The paper begins with a review of the literature to frame the principles of active learning in information literacy instruction and user preferences for effective digital learning object design. It then presents an overview of the design factors considered in the development of the Guide on the Side tutorials, and a discussion of the development and implementation process, presenting an analysis of student performance and perception of the use of the newly introduced learning objects. The report concludes with a discussion of findings and addresses the universality of the tutorials in information literacy instruction.

## Literature Review

In their seminal report on active learning, Charles Bonwell and James Eison (1991) present persuasive evidence that passive instruction leads to audience inattention within the first 15 minutes of traditional lecture based delivery (p. 9). They suggest that in order to develop cognitive skills and increase retention, alternative teaching strategies that engage students in problem solving and guided design, including visual activities, should be incorporated into instruction (p. 38).

Active learning as an accepted form of experiential instruction has been readily embraced by educators. A review of recent literature on the subject of information literacy instruction shows a range of attempts to integrate the pedagogical theory of active learning into a variety of library and information literacy programs. Today, animated and interactive online tutorials created with screencast software, YouTube videos, and game-based learning scenarios are all a part of the library instruction toolkit (Sult, Mery, Blakiston, & Kline, 2013). The interactivity inherent in these new technologies engages students, “contributes to learner motivation” and if designed correctly, allows for assessment of student understanding upon completion (Dewald, Scholz-Crane, Booth, Levine, 2000, p. 39). Fosmire and Macklin (2002) incorporated the active learning technique of problem-based learning into information literacy modules that were directly embedded into science instruction at Purdue University. Their unique collaboration between subject faculty and librarians effectively “leveraged the increasing popularity of active learning techniques into

opportunities to facilitate the acquisition of information skills” (Fosmire & Macklin, 2002, Conclusion section, para. 1) while producing instructional modules of direct relevance to the university’s science curriculum. Ross and Furno (2011) used clickers in the classroom to increase student participation and foster active student engagement through immediate feedback. The results were positive; the authors reported that students were “engaged and motivated” (p. 958) and that they took “responsibility for their own learning” (p. 957). Likewise, Holdereid’s (2011) study of the use of clickers in information literacy instruction reinforced the positive impact of the use of active learning strategies of engagement, presenting tangible evidence of a four point increase from pre-test to post-test in information seeking competencies using these interactive strategies as compared to lectures as the primary method of instruction (p. 27).

The application of active learning theory to digital learning objects is also evident in the literature. In an early review of the University of Arizona’s Guide on the Side tutorials, Farkas (2012) notes that the visual and interactive features of the tutorials effectively integrate the fundamental principles of active learning, offering instant feedback, engaging students, and retaining their attention. Incorporating active learning principles into the tutorial design process, however, has proven somewhat challenging. As Farkas notes, “it’s a great deal more difficult to develop active learning exercises, or even interactivity, in online instruction” (2012, para. 2) than in traditional face-to-face instructional sessions. Sachs, Langan, Leatherman, and Walters’ (2013) review of online information literacy tutorials offers valuable insights into this area, assessing student performance and satisfaction with various learning modalities and suggesting best practices. Notably, of the tutorials reviewed, those that were “visually engaging, interactive, available at the point of need, and...[supportive of] self-navigation” (Sachs, Langan, Leatherman, & Walters, 2013, p. 331) ranked highest, with students “indicating a strong overall preference for ...[active learning style] tutorials” (p. 334). A survey of existing information literacy tutorials echoes this sentiment, noting that “in addition to contents, interactivity, multimedia, and game-like quality are...essential components in an effective online tutorial” (Yang, 2009, p. 686).

Student usability studies give further insights into the structural layout, timing, and sequencing of tutorial design. In her usability study analyzing student comparisons of screencasting with screenshot tutorials, Mestre (2012) noted a range of user preferences that prove useful in shaping effective design methodology. Mestre reports student preferences for static presentation of content with effective use of screenshots, clear and consistent navigation, features that highlight salient points for students to note, text to be kept at a minimum, and a preference for ways in which students can work in a search interface alongside the tutorial (p. 272). An investigation of the effectiveness of digital learning tools and tutorials for online database instruction (Mery, DeFrain, Kline, & Sult, 2014) notes similar learner preferences guiding tutorial design: the authors reported that as a result of their investigation, Guide on the Side tutorial design improvements included “eliminating redundant text, simplifying instructions, and shortening [...] length” (p. 78).

## Methodology

### ***Methods and Tools***

In 2012, the University of Arizona Libraries shared its web-based open source Guide on the Side tutorial software, joining the principles of active learning with real world research scenarios. Written in PHP and MySQL and designed to run on a Linux platform, this open source software has been formally recognized by the leading national library professional associations for “creating online and interactive tutorials aimed at improving authentic and active learning” (Everett-Haynes, 2013).

By overlaying an interactive guided tour on the left side of the computer screen and leading a student through the research process on the right side of the screen, the Guide on the Side tutorials serve as a 24/7 coach for students. These guides allow librarians to draw attention to those features of each research tool that will most efficiently yield targeted search results. The tutorials could be designed with set actions that all users must take, or could be personalized to allow individual search inquiry. The interactive nature of the tutorials reinforce student understanding of the search tools, as they see the immediate results of each action taken.

With so many research tools available, an early decision was made to focus on the newest and potentially most complex search interface available at Santa Rosa Junior College, the discovery layer (Smart Search). Two guides introduced students to various aspects of Smart Search, one providing a general overview of search features, including keyword and phrase searching, and the impact of using limiters. A second focused on accessing and using e-books through Smart Search, identifying features that provide assistance with note taking and citation support. A third guide, developed to familiarize students with the layout and search tools available through Sage Knowledge, provided an overview of one of the library's core reference e-book collections.

### **Design**

Following the trend of applying active learning concepts to information literacy instruction, the guides were designed to demonstrate information relevancy and value. Guide content consisted primarily of real world, practical examples, engaging users in active learning scenarios. Emphasizing general information literacy concepts over tool-specific, procedural learning, guide content was geared towards imparting transferable skills and improved understanding. Adopted to promote effective, efficient research methods and strategies, this approach targets critical thinking and cognitive skill building.

Several factors influenced the initial design phase of the project:

**1) Interactive.** The tutorials should be succinct, interactive learning tools that deploy active learning opportunities to expose students to a range of available library research interfaces.

**2) Curriculum compliant.** Each tutorial should support the College's information literacy instruction program by aligning learning activities with the Student Learning Outcomes (SLOs) articulated in the Course Outline of Record for LIR10: Introduction to Information Literacy, a credit course taught at Santa Rosa Junior College.

**3) Promote focused engagement.** These learning objects would address the following problem: How do libraries help students overcome the barriers of unfamiliar research tools while redirecting student focus to the process of efficiently locating, assessing, and analyzing information? Santa Rosa Junior College has a series of step-by-step library skills exercises that lead students through the use of core research tools, but students sometimes get lost in the granularity of these paper-based tutorials. "Why am I doing this?" is not an uncommon question for a student to ask when seeking help with these assignments.

A "What's the Point?" feature was designed to serve as a focus mechanism, highlighting key concepts and explaining their underlying importance in the search process. Connecting rote actions to specific information literacy skills, this mechanism was designed to improve comprehension.

**4) Succinct.** Time considerations also factored into the design process. Attempts to minimize information overload and improve information retention were paramount. As a result, the guides were designed with relatively short target durations, approximately ten

minutes per tutorial. Constraining the scope of the guides was deemed equally important. Presenting just six substantive frames, each guide focused on three learning objectives, with concepts drawn directly from the Course Outline of Record.

**5) Consistent interface.** With regard to the layout or the structure of the guides, uniformity was the chief design concern. Consistent term use, image placement, and instructions were adopted to bolster ease of use, creating a common user experience across the guides. In addition to ensuring a seamless transition from guide to guide, this allowed the delivery mechanism to recede into the background while directing student focus to the instructional content.

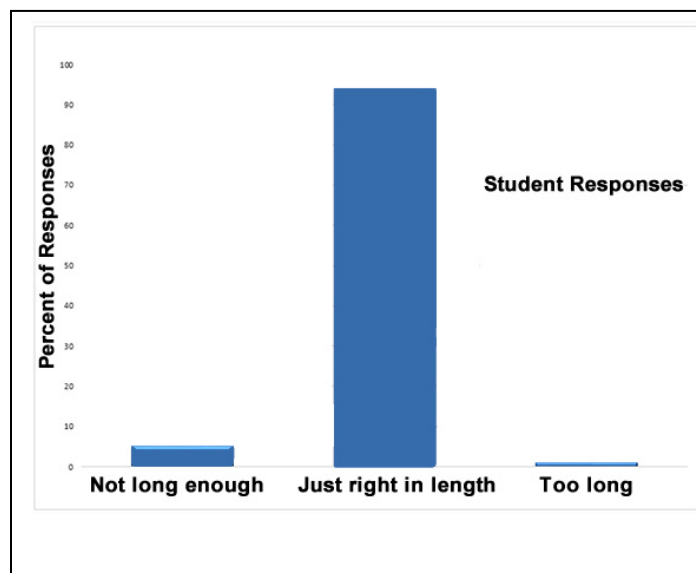
## ***Development and Implementation***

The principles of rapid prototyping that are used in software engineering were adapted and applied to the tutorial development process so that the reactions of end-users could quickly be collected and incorporated. Rapid prototyping is well suited to instructional design projects because this design model offers the flexibility required when dealing with a “human-factors intensive” application, such as the process of learning (Tripp & Bichelmeyer, 1990). This iterative cycle of development, assessment, and improvement was an effective way to collect and integrate the feedback of three target audiences: instructors, librarians, and students. Written scripts provided the basis for each initial tutorial prototype. The first prototypes were assessed by librarians, who gave specific feedback about the scope of the guides and the clarity of instruction. A second set of prototypes, modified with this first set of suggestions, were assessed by a focus group of faculty preparing to teach online. The faculty identified areas where they felt students might be confused, and identified uses of jargon that escaped the librarians’ review. After incorporating faculty suggestions, the prototypes were ready to be tested on a pilot group of students.

Six information literacy classes took part in the summer testing of the first two guides created. Students in the pilot user groups were asked to provide feedback about their impressions of the tutorials in a questionnaire (see the Appendix). This yielded data about a range of features and allowed for additional design refinements based directly on student feedback.

## **Findings and Results**

Of the students who took the tutorials, 110 responded to a voluntary questionnaire designed to gauge their perceptions. A substantial 94% of students felt the tutorials were of adequate length. Only 5% felt the tutorials were not long enough (see Figure 1).



**Figure 1.** Student perception of tutorial length

In assessing comprehension of the interface, 96% indicated that they increased their understanding of Smart Search (see Figure 2).

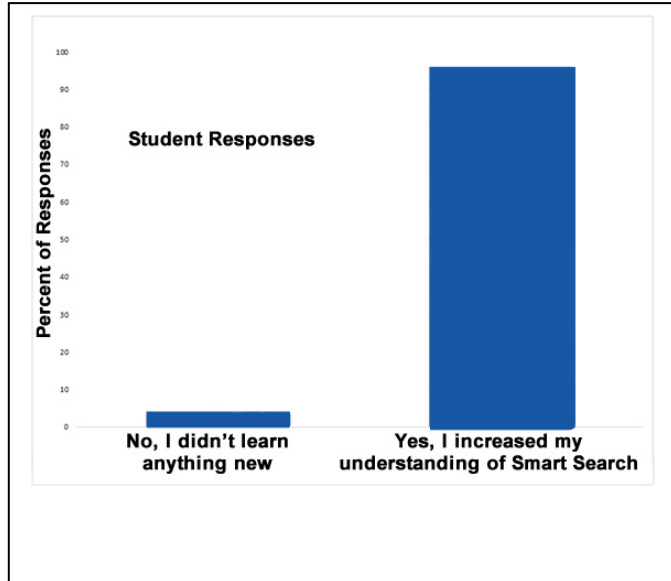


Figure 2. Student perception of information value

Attempts to create a design element that would help keep students focused proved successful, with 69% of students reporting that the “What’s the Point” feature helped to explain core concepts. A corresponding 23% of respondents elected not to click on these focus mechanisms, indicating a need for additional tools to help students maintain interest in the tutorial (see Figure 3).

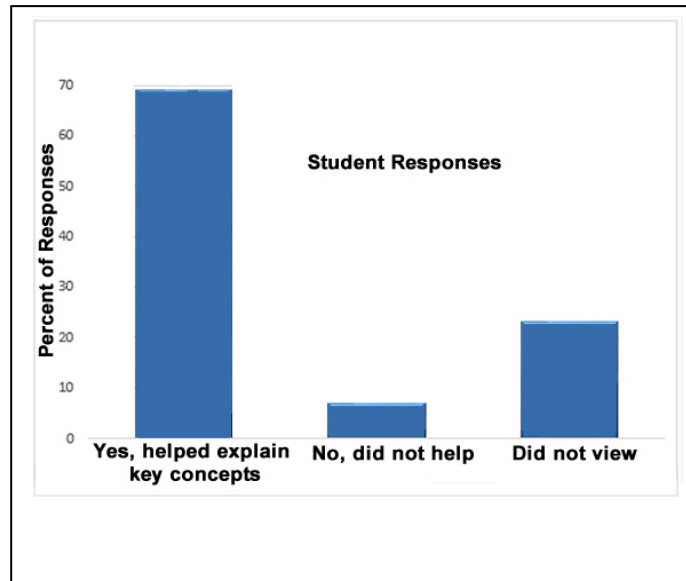
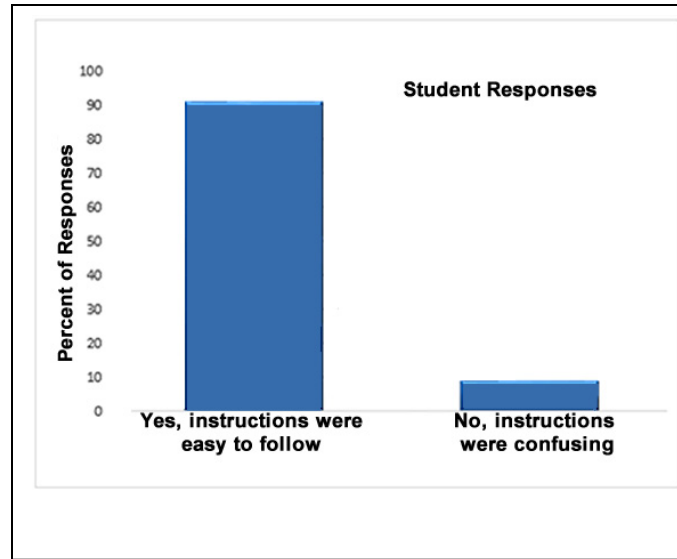


Figure 3. Focus mechanism

With regard to having a constant overlay of instructions on the left side of the screen, 91% of students found it easy to follow the instructions in this format, while 9% reported confusion (See Figure 4).



*Figure 4. Layout and ease of use*

## **Overall Impressions**

An open-ended question was asked to solicit additional impressions about the effectiveness of the tutorials. The following prompts were provided:

- Did you feel it was a good way to quickly learn more about the features available in Smart Search?
- Do you feel more confident in how to use Smart Search now that you have taken the tutorial?
- Was this tutorial helpful?

Of 131 free-form responses to the open-ended questions, 88.5% were resolutely positive in nature. Students provided detailed observations, such as:

“This was possibly one of the most useful tutorials I’ve ever used. I’m not exactly a whiz at technology, and this was so easy and comprehensive. The pictures in the tutorial made it much easier to locate what section of the page they were referring to.”

“I wish this was in place four years ago when I returned to school. It would be to any student’s advantage to take the tutorial. It should be required from most instructors. It was short and sweet, but very informative.”

“Great tutorial – it was brief enough to keep anyone’s attention span and yet direct to what we need to know.

Just over 9% of respondents, expressed neutral or comments that were mixed in nature, containing both positives and negatives about their experience with the guides:

“Most of the information I had already known, but the ‘What’s the Point’ did help me get a better understanding and I had not known about putting something in quotes to make a search more precise. I will have to do that next time I am researching a topic.”

“For the most part, the tutorial was very helpful. I definitely have a good understanding of using Smart Search. Only suggestion I’d have is to expand the type of sources descriptions. That was a little confusing. Also I had to redo the tutorial once because the quiz questions disappeared after I clicked on the screen.”

“The tutorial was helpful but a little fast paced. The questions being asked during the tutorial helped me understand Smart search [*sic*] a little better as well as the images.”

Just over 2% of respondents expressed negative experiences. These tended to relate to the functionality or navigation aspects of the software:

“I could not navigate this tutorial. It was not user friendly and would not let me in.”

“I got a little confused with what to read and understand with the guide.”

“I thought the layout annoying for you to have to click on the arrow each time. A regular page format (scroll up and down) would have been better. The layout gets extremely frustrating when trying to go back and re-read something if you forgot, you would have to keep clicking the arrow to the left and then all the way to the right to click on the answer.”

Some of the functionality issues experienced by the users may have been related to browser blocking of active content. A more detailed discussion of this issue is contained in the Challenges section of the report.

### **Comparison of Student Performance**

Surveys intending to gauge student perceptions of research readiness, particularly in an online instruction environment, indicate that most students believe that not only are they prepared to participate in online courses, but that they possess adequate information literacy skills. According to one report assessing the landscape of community college students, “98% [of students] indicated they are technologically savvy enough to participate fully [in online classes]” (Li-Bugg & Rudolph, 2012, p. 37). Student confidence, however, is often overestimated and may not take into account the sophistication of research interfaces. According to the ECAR study of 2008, “students may have confidence because they are unaware of the complexities involved or just because they have grown up with technology. This potential gap between actual and perceived skills and literacy is important to understand and factor into strategies for teaching and learning at the institution” (Salaway & Caruso, 2008, p. 11). Students tend to equate their perceived ease of generic web browsing using popular search engines with fluency in effective research skills due to a lack of exposure to the more complex interfaces of the latter. This confusion between “information literacy” and “Internet savviness” is borne out by the 2009 ECAR study: “ECAR also asked three survey questions about how students view their own information literacy skills and found that respondents considered themselves quite Internet-savvy users. Eight out of 10 (80%) said they are very confident in their ability to search the internet effectively and efficiently. Almost half (45.1%) rated themselves as very skilled, and another third (34.9%) rated themselves as experts” (Smith, Salaway, & Caruso, 2009, p. 16).

Bearing in mind the gap between perceived research skills and student unfamiliarity with the library discovery layer, two groups of students were used to assess student understanding of the scope of a discovery layer and determine the effectiveness of a Guide on the Side in raising comprehension of this sophisticated tool. Students who did not take the Guide on the Side tutorial incorrectly answered a question testing their comprehension about the scope of a discovery layer 6.70% of the time. Students who took the Guide on the Side tutorial incorrectly answered the same question 3.66% of the time. This represents an almost 55% increase in student performance in correctly gauging the scope of a discovery layer. In effect, students who completed the Guide on the Side exhibited greater comprehension of the scope of a discovery layer, demonstrating the value of using this type of active learning tool to complement the introduction of new and complex library research interfaces.



## ***The Dilemma of Library Jargon***

The technical terminology used in library research is unfamiliar to most students. One instructional objective of the guides was to demonstrate certain advanced search techniques, such as the use of phrase searching to increase precision of search results. Informal feedback from English as a Second Language and Basic Skills instructors indicated that students may not be familiar with the term “precision” as it appeared in the guides. This observation extends to all student groups: in a study of 300 first and second year undergraduate students at a state university library, only 31.8% of students surveyed correctly recognized the term “precision.” (Hutcherson, 2004). Hutcherson recommends defining the terms the first time they are used as a way of developing a common understanding of key concepts. This approach was adopted in limited measure, however, so as to keep the length of the guides brief and to minimize potential points of distraction. Adopting a strategy of developing adjoining assignments that support identification and definition of new terms may be an effective complementary strategy. For example, assigning students a group activity to build a collective online glossary of terms extracted from the guide would reinforce the familiarity with new and unfamiliar terminology.

## ***Browser Functionality***

The interactive nature of the Guide on the Side software depends in part upon using active content to capture the user’s responses to questions asked throughout the tutorials. Most newer versions of browsers prevent “active” or “mixed” content from automatically displaying, requiring action on the part of the user to ensure that the guides are fully functional. When this measure is not taken, many of the interactive components of the guide, such as the table of contents and the navigation features, may be disabled. This situation occurs with Internet Explorer (version 10+), Mozilla Firefox (version 23+), and Google Chrome (version 21+).

To offset the problems encountered with blocked content, a brief set of troubleshooting instructions that guide users through the necessary steps to enable a browser to view blocked content were prepared.

## **Conclusions**

Developing Guide on the Side interactive learning tutorials successfully met the objective of introducing students to library research interfaces. The tutorials have positive implications for self-guided interactive learning. In assessing their effectiveness, 96% of students reported increased understanding of the library interfaces being introduced through the learning objects. A comparison of student test performance reinforced this finding, indicating an almost 55% increase in correct responses to a question gauging library interface comprehension among students who completed the tutorials versus those students who had not taken the tutorials. The assessment also indicated success in design: 94% of students perceived the length to be sufficient for learning, while 91% felt the layout to be easy to understand and use.

There is room for improvement in designing mechanisms that alert students to the features the tutorial highlights. Only 69% of students felt the “What’s the Point” focus mechanism was helpful, and 23% did not elect to use this feature. The guides could be improved by visually distinguishing the focus mechanism from other interactive features through modifications to the tutorials Cascading Style Sheet (CSS) code, and the introduction of visually distinctive graphics to draw students’ eyes to the “What’s the Point” mechanism.

The potential for developing guides to address discipline-specific research tools or subject-specific assignments exists. Opportunities for growth in this area present exciting possibilities for direct collaboration with discipline-based faculty and the potential to better integrate library resources and tools directly into classroom activity.

The interactive tutorials developed at Santa Rosa Junior College, both generic in nature and discipline-specific, can be widely used across the institutional curriculum thanks in large part to their accessibility on the library website and the ease with which they can be embedded in the learning management system for online and hybrid classes. The concept driving the tutorial design and development is directly applicable to the shared student profiles common to 2 and 4-year academic institutions. While the guides developed at Santa Rosa Junior College have been specifically tailored to this institutional compliment of online resources and are not directly transferrable to other institutions because of access restrictions placed on proprietary database and e-book vendor agreements, the design process outlined here can serve as a model for other academic libraries with similar research tools. The open source nature of the underlying Guide on the Side software, coupled with the rapid prototyping design approach may be directly replicated at other academic institutions facing the same pressure to develop interactive learning objects that support information literacy instruction and integration of library resources into multi-disciplinary classroom activities.

## Appendix: Questionnaire

### 1. How was the length of the tutorial?

- Not long enough.
- Just right in length.

### 2. Did you find the information useful?

- No, I didn't feel as if I learned anything new.
- Yes, I learned more about Smart Search than I knew before.

### 3. Were the "What's the Point" features in the tutorial helpful?

- Yes, they helped explain the concepts.
- No, they didn't increase my understanding.
- No, I didn't click on them.

### 4. Did you find the guide's layout, with the instructions on the left and the search screen on the right, easy to use?

- Yes, it was easy to follow the instructions.
- No, I got confused.

**Please tell us what you thought about this Guide on the Side. We welcome any impressions you have. You might consider the following questions:**

**Did you feel it was a good way to quickly learn more about the features available in Smart Search?**

**Do you feel more confident in how to use Smart Search now that you have taken the tutorial?**

**Was this tutorial helpful?**

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## Biographies



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